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### SURGICAL TREATMENT OF AORTIC STENOSIS.

By DOUGLAS STUCKEY, R. G. EPPS

AND

IAN MONK,

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SUCCESSFUL surgical relief of aortic stenosis was first reported by Bailey *et al* (1952), who described the trans-ventricular approach with the use of a valvotome and an expanding dilator. At about the same time, Brock began using a similar technique, and in 1957 was able to report his results in 120 cases.

Our experience at the Royal North Shore Hospital of Sydney dates from January, 1955, when our first patient was operated on. A second operation was performed in 1956. After the visit of Brock to Sydney in November, 1957, our interest was stimulated, and aortic valvotomy has been performed on an additional 19 patients up to the end of 1958. This report is a brief account of our experiences in the surgical treatment of aortic stenosis, particularly during the last year.

### Clinical Features.

The ages of the 21 patients submitted to aortic valvotomy varied from 13 to 75 years, all except four being in the age group 40 to 60 years. Sixteen were males and five were females. A previous history of rheumatic fever was elicited in only five cases. Symptoms had been noted by 20 patients for periods ranging from one to 16 years, and were disabling in all except three of them. Six patients had been forced to give up work, and another four were almost bed-ridden. Shortness of breath on exertion was present in all of them. Orthopnea or attacks of paroxysmal nocturnal dyspnea had occurred in 11 cases, and episodes of frank congestive cardiac failure in five.

The importance of two symptoms which are specifically related to obstruction of the circulation should be stressed. Angina pectoris of classical type was present on exertion in 13 cases, and was usually a disabling symptom. It has been suggested that this symptom occurs in patients with aortic stenosis because there is inadequate coronary blood flow, due to a low fixed cardiac output which does not increase adequately on exertion (Stuckey, 1955). Restricted cardiac output is probably responsible for another important symptom of aortic stenosis, effort syncope, which occurred in eight

of our patients. Angina pectoris, effort syncope and symptoms of left ventricular failure should all be regarded as urgent indications for further investigation with a view to surgical treatment. In such cases, sudden death during exertion is a common termination.

#### Physical Signs.

The findings on physical examination are important in directing the attention of the practitioner to the nature of the lesion in a patient who complains of symptoms of this description. With severe aortic stenosis, the peripheral arterial pulses are invariably of small amplitude and are usually of plateau type. The blood pressure is usually low, but hypertension may coexist, and one of our patients had blood pressures of the order of 180/120 mm. of mercury. An ejection type mid-systolic murmur is invariably present, but may not be loud, and a thrill was palpable in only 13 of our cases. The murmur is usually maximal at the aortic area, but in two of our cases it was loudest at the left border of the sternum and in two at the mitral area. An early diastolic murmur of aortic origin was heard in seven cases, but in the absence of peripheral arterial signs aortic incompetence was judged to be trivial.

Aortic stenosis can be easily overlooked on physical examination. Suspicion should be aroused by symptoms or signs of left ventricular stress without obvious cause, or by a history of angina on effort in a patient with a systolic murmur and normal blood pressure.

#### The Electrocardiogram.

Patients suffering from severe aortic stenosis inevitably show changes in the electrocardiogram with the passage of time. Electrocardiographic abnormalities were noted in all the cases in the present series, left bundle branch block being present in one and varying degrees of abnormal left ventricular preponderance in the remainder. Vertical electrical position is common, and gross changes are often found in left ventricular surface leads, with depression of the S-T segment and deep inversion of the T wave. In general, an abnormal electrocardiogram should be regarded as an additional indication for specialized investigation.

#### X-Ray Examination.

Characteristic changes in the cardiac silhouette on radiological examination are not a feature of aortic stenosis, but prominence of the ascending aorta to the right of the sternum, due to post-stenotic dilatation, was noted in nine cases. The size of the heart was within normal limits in five cases, showed only slight enlargement in a further five and in the remainder there was moderate to gross enlargement. It is important to realize that normal X-ray appearances are consistent with the presence of severe aortic stenosis causing disabling symptoms.

#### Tomography.

We are indebted to Dr. R. M. de Lambert, Honorary Radiologist to the Thoracic Unit, Royal North Shore Hospital, for developing an effective technique of tomography which has been extremely useful in demonstrating calcification of the aortic valve. Of 16 patients with aortic stenosis examined in this way, only one failed to show calcium deposits in the valve area. Routine X-ray examination had revealed valve calcification in a further three patients, so that there were only three in whom this abnormality was not demonstrated. One was a woman, aged 45 years, with rheumatic involvement of both mitral and aortic valves, and the others were aged 13 and 14 years respectively. We believe that good tomograms will demonstrate valve calcification when it would be missed or in doubt on X-ray fluoroscopy even by experienced observers. There is the additional advantage that permanent documentary evidence of this important abnormality is obtained.

Our impression is that the amount of calcification is directly proportional to the severity of the aortic stenosis in terms of length of history (which may be the age of

the patient), the systolic pressure gradient across the valve, and the presence of specific symptoms of circulatory obstruction, particularly syncopal attacks or anginal pain on effort. The amount and disposition of calcium, therefore, is important for both diagnosis and assessment of severity. Excessive calcification spreading beyond the valve to the left ventricular outflow tract may well be a contraindication to operation.

#### Left Ventricular Puncture.

Demonstration of a substantial difference between the systolic pressures in the left ventricle and in the aorta gives physiological proof of obstruction at the aortic valve or subvalvar region, and provides an accurate measure of its severity. Left ventricular puncture (Brock *et alii*, 1956) has proved to be a safe and satisfactory procedure. The test is performed under local anaesthesia after premedication, and percutaneous puncture of the left ventricle from the region of the cardiac apex is performed. Pressures recorded within the left ventricular cavity are compared with those obtained from a brachial artery. This investigation is now regarded as an essential part of the assessment for surgery, and was performed in 19 cases in the present series. The systolic pressure gradient between the left ventricle and the brachial artery was 100 mm. of mercury or more in 10 cases, between 80 and 100 mm. of mercury in six, and between 50 and 80 mm. of mercury in the remaining three cases.

#### Surgical Considerations.

Open aortic valvotomy was performed on our three youngest patients, aged 13, 14 and 24 years, by the transaortic route during occlusion of the circulation under hypothermia (Swan and Kortz, 1956). For the remainder, all older patients with varying degrees of valve calcification, closed aortic valvotomy was performed by the transventricular method, following the technique of Brock (1957). Pressures were measured in the aorta and left ventricle before and after dilatation of the valve, and if the pressure gradient had not been substantially reduced, further dilatation was performed. In only one instance was the pressure gradient completely abolished, but in all the others it was reduced to less than half the pre-operative figure. This has been confirmed in two cases by left ventricular puncture several months after operation. The production of aortic incompetence by the operation has not proved to be a problem.

As regards other operative techniques, we have not performed closed aortic valvotomy by the transaortic route. In a number of American centres (for example, Lillehei *et alii*, 1958), open aortic valvotomy is being performed with the use of total cardio-pulmonary bypass and a pump-oxygenator. So far the reported results of this method for older patients with calcified valves have been disappointing; the operative mortality has been high and serious aortic incompetence has occurred in some of the survivors. We believe that when heavy calcification is present, the anatomy of the valve is so grossly disordered that even painstaking dissection under vision cannot restore the valve to normal function.

#### Results.

The results obtained in our 21 cases of aortic valvotomy can be expressed as follows:

Excellent 3

Good 11 (one late death three months after operation)

Fair 3 (one late death one year after operation)

Poor 1 (died three months after operation)

Operative deaths 3

Of the operative deaths, one patient died at operation as a result of occlusion of the left coronary artery by a plaque of calcium, and one died on the third post-operative day with emphysema and aortic incompetence as important factors. The third operative death was of our first patient, who died on the twelfth post-operative day. Impairment of renal function and persistent hiccup contributed to the death of this man, who had

been in congestive cardiac failure resistant to medical measures for many months before operation. It is doubtful whether he would have been accepted for surgery today.

Fifteen patients are alive and well at the present time. In two the result is classed as fair, and in the remainder as good or excellent. A number of patients have been able to resume work and many are grateful for relief from crippling disability. Aortic stenosis is a serious disease with a short prognosis once symptoms appear, and on the whole, we believe that the results of surgery have been gratifying.

#### Summary.

Aortic valvotomy has been performed on 21 patients suffering from severe aortic stenosis at the Royal North Shore Hospital, 19 of these having been operated on in the past 12 months. The results of surgery are briefly presented.

The clinical features of aortic stenosis are reviewed, stress being laid on the importance of angina pectoris on exertion and effort syncope as symptoms of the condition.

Left ventricular puncture has proved to be a safe and satisfactory procedure, and is regarded as an essential investigation in the pre-operative assessment of patients with aortic stenosis.

Tomography with an improved technique has been very useful in demonstrating radiologically the amount and distribution of calcification in the aortic valve, an important consideration in the surgical treatment of older patients.

When heavy valve calcification is present, closed aortic valvotomy by the transventricular route has given satisfactory results in our hands.

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### ESTROGEN AND PSYCHOSEXUAL DISORDERS.<sup>1</sup>

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Melbourne.

THE purpose of this paper is to present a commentary on the use of oestrogen in the treatment of psychosexual disorders, particularly male homosexuality. Twenty-six patients have been treated since 1950, and most have been examined at regular intervals since treatment. The results are sufficiently encouraging to justify their presentation, especially in view of the absence of authoritative reference to this subject in the literature.

#### Physiological Rationale.

For many years it has been routine surgical practice to administer pre-operatively large doses of oestrogen to

adult males who are to be circumcized. This is done with a view to inhibiting the erectile mechanism for some time after operation, so that healing will not be impaired by the occurrence of spontaneous erections. It is said to be effective.

It is also common practice to use oestrogens in an attempt to prevent the occurrence of the complication of orchitis after infective parotitis in adults. Patients so treated sometimes suffer from orchitis; but all whom I have questioned have stated that for some weeks after treatment they have been impotent and lacking in interest in sex.

These observations suggested that oestrogen might inhibit male sexuality at psychological and physiological levels, and that if this was true, it might be useful in the treatment of the paraphilias.

Oestrogen inhibits the secretion of the anterior pituitary hormones, including the gonadotrophins, but has no direct action on the ovary or testis (Samson Wright, 1952). When oestrogens are injected for long periods, they produce marked structural and functional changes in the anterior pituitary lobe. The gland becomes considerably enlarged, and may show intense congestion and haemorrhages or other destructive changes. Prolonged inhibition of gonadotrophic hormone may lead to atrophic changes in the testis. Prolonged administration of oestrogens results in various degrees of proliferation of the alveoli and ducts of the breast and growth of the epithelium of the nipple in both sexes. This suggests that oestrogen therapy should be limited in dosage and duration.

It is recognized that some adrenocortical hormones are androgenic in function, and that the rate of production of these hormones is partly determined by the level of circulating adrenocorticotrophic hormone. The well-documented fact that a considerable proportion of men castrated after puberty remain potent and capable of coitus may be explained by the action of these androgenic adrenocorticoids, including androsterone.

Guttmacher (1951) refers to a series of 80 sexual criminals castrated in Switzerland; 60% were free in the community. Of these, 7% became recidivists. He also refers to the results obtained by Sturup at the special institute for "sex psychopaths" at Herstedvester, Denmark. Of 60 patients released after castration, only two became sexual recidivists, while half the offenders released without castration committed further offences. Of course, criminal recidivism is not a valid measure of persistent sexual drive or of potency. One supposes that the incidence is much higher than these figures suggest. It has been stated that up to 20% of adult male castrates are capable of coitus.

These observations suggest that castration and irradiation of the testes are not dependable methods of treatment.

In this series of 26 patients treated with stilboestrol, there was only one failure to reduce or eliminate sexual drive according to the dose and duration of administration. The exception was apparently a complete constitutional homosexual, who presented a definite clinical picture of true psychopathic personality. His pathological lying had been described by several psychiatrists as pseudologia fantastica. He asserted that his desire for passive sodomy remained unchanged.

Golla and Hodge (1949) described hormonal treatment of sex offenders. In all 13 patients libido was abolished; when 50,000 units of oestradiol benzoate were given daily, libido was abolished within two weeks. It was found that a dose of 20,000 units daily prevented the return of libido, which otherwise occurred within three weeks of discontinuance of treatment. They pointed out, however, that there was no reason to believe that, even after years of treatment, sexual power would be abolished permanently. These authors concluded that oestrogen treatment should be adopted whenever possible in cases of abnormal and uncontrollable sexual desire in men.

<sup>1</sup>Read on behalf of the writer by Dr. P. Zovaltaro, at the Congress of the Australasian Association of Psychiatrists, Perth, October, 1958.



### Psychological Rationale.

The commonly accepted concept is that the sexual drive has an aim (normally ejaculation with orgasm) and an object (normally the genitalia of an adult of the opposite sex). The paraphilias (or sexual perversions) are usually classified as follows: (i) abnormalities of the intensity of the drive, which result in satyriasis and nymphomania at one extreme and impotence and frigidity at the other; (ii) abnormalities of the aim of the drive, which result in substitution of aggressive actions for sexual ones, or some other form of activity; (iii) abnormalities of the object of the drive, which result in fetishism, homosexuality, bestiality, etc. It was anticipated that oestrogen would be useful in the first and last groups. The same preparation was used in all cases, and oral administration was referred, because it involved the patient in active participation in his treatment, and because it necessitates regular interviews which provide an opportunity for whatever psychotherapy may be applicable.

It was found that the psychological and physiological components of the sex drive were inhibited with dosage that did not produce undesirable side effects.

### Clinical Material.

The present series of 26 patients treated with stilboestrol included several varieties of disorder which are summarized below.

There were nine patients with facultative homosexuality, of whom three were married. All were of average or higher intelligence. The average age of presentation was in the middle thirties, while the whole group stated that homosexual phantasy had begun during early adolescence. These cases are diagnosed as facultative homosexuality on the criterion of the occasional or frequent occurrence of heterosexual intercourse, of heterosexual masturbation phantasy, or of occasional heterosexual dreams associated with nocturnal emissions. No patient in this group could be fairly described as grossly feminine-identified.

There were seven true constitutional homosexuals, so classified because of the absence of any sexual interest in women and the total absence of any heterosexual phantasy as described above. The average age of presentation was in the early twenties. Two were high-grade congenital mental defectives, and another was a chronic schizophrenic. Four were grossly feminine-identified, and only one of these four patients did not clearly have a psychopathic personality.

Five patients had abnormally powerful heterosexual drive. Definite satyriasis was present in only one. In the others, the average frequency of desire for sexual gratification was once in twenty-four hours (in their late thirties). All five patients were involved in court proceedings, because, during times of frustration of their sexuality, they had indulged in anti-social forms of sexual expression. Three had exhibited their genitalia to adult women while masturbating, and the other two had criminally assaulted female children by genital fondling. These five men were all of average intelligence and married.

There were two cases in which exhibitionism had first occurred in married men in their forties. Both were mild but definite manic-depressives, whose sexuality was normal except during periods of hypomania, when they experienced an increase in libido which became troublesome to their wives. They sought relief by exhibitionism.

There were three miscellaneous cases. One patient was a homosexual sadist, one was a heterosexual voyeurist, and one suffered premature ejaculation, which occurred with full erection at the commencement of fore-play.

In only two of the 26 cases was the onset of sexual abnormality in the late fifties; both have since suffered progressive arteriosclerotic intellectual deterioration. In another case, sexual abnormality first appeared after a severe head injury, in which the patient's skull was

fractured in a motor-car accident; he showed no significant intellectual deterioration.

Four patients were chronic alcoholics, while most of the others admitted to socially normal drinking and asserted that sexually aberrant behaviour occurred when they were mildly intoxicated. Only seven patients were total abstainers.

Fourteen patients presented on the instruction of the lawyers who were to defend them in imminent court proceedings.

Twelve patients were treated with stilboestrol, though they were not involved in court proceedings. At least 20 other practising homosexuals were seen who refused stilboestrol, though seeking "cure" of their homosexuality. In none of the court cases was stilboestrol refused.

### Management.

All patients were interviewed on several occasions, with a view to obtaining a thorough history of sexual development and to evaluating personality and interpersonal relationships.

In 18 cases in which it was desired to inhibit completely sexual desire and the erection mechanism, it was decided to administer daily five milligrammes of stilboestrol by mouth, for two weeks. With the exception of the unreliable psychopath mentioned earlier, all patients reported a cessation of all erections and phantasies within ten days. All reported that interest in their particular and varied forms of sexual pleasure had ceased.

One patient reported soreness in his nipples four weeks after the commencement of oestrogen therapy, but this cleared up within a fortnight. It was arranged that all patients would be examined every two to four weeks, and all patients reported a gradual return of phantasies and erections.

The shortest period of complete inhibition was six weeks while the longest was six months. In most cases there is complete inhibition for about three months.

In all cases there was full response to repeated courses of stilboestrol. Increased dosage has not proved necessary, and the interval between courses tends to lengthen as the patients are treated over a number of years. Two patients have been treated regularly over more than five years, and most for more than two years.

One patient (a constitutional homosexual) responded completely to the first course, which was given before his trial. However, he has not been seen since by myself or by his family. The social importance of this will be discussed later.

In eight cases in which it was desired merely to reduce the intensity of libidinal drive to a controllable level, one milligramme of stilboestrol was given daily until the patient first noticed a reduction in his drive. Further reduction continues for about a week after cessation of treatment. None of these patients complained of excessive lack of interest, nor did their wives. None of these patients were involved in court cases, and included in the group were married facultative homosexuals, exhibitionists, the voyeurist and the patient who suffered from satyriasis.

Two or three weeks' treatment was necessary to produce an effect on the intensity of libidinal drive.

### Results.

During the follow-up interviews, some attempt has been made to assist these patients to develop more normal sexual drives. Most of the facultative homosexuals have not needed more than two years' treatment before becoming apparently contented with heterosexual. The greatest difficulty arises with the occasional single man who has a markedly schizoid personality.

The exhibitionists were all married and were able to find satisfaction in normal behaviour within a year.



This also applied to the voyeurist. The results would probably not be nearly so good had these patients been single men, and had their aberrant impulse completely replaced normal sexuality.

None of the men regarded as true constitutional homosexuals has developed any interest in heterosexuality. This was not expected. If repeated courses of stilboestrol are not given, the former homosexual drive and phantasy reappear. A few weeks later, overt behaviour can be expected to follow. This has been verified repeatedly in each of five cases in this group of eight.

The homosexual sadist was the most unusual patient in the whole series.

This lad, aged 18 years, had been arrested after extensive slashing of a boy of nine. He admitted to police that he had slashed the boy about the face and trunk and had cut off his penis. When he was examined the following day, he stated that he had masturbated just prior to assaulting the child, and asserted that his only masturbation phantasies were of cutting up a little boy, cutting off his penis, cutting his throat and strangling him. He stated that the phantasy which produced his orgasm was the "death convulsion" of the boy. A diagnosis of homosexual sadism was made, because the object of this man's sexuality was another male, and because the aim of his libido was blood-letting, mutilation and killing rather than the giving and receiving of sexual pleasure. It was not known whether stilboestrol would have any effect on aggressive phantasy and behaviour, even though there was a theoretically sexual origin of his aggressiveness. However, it was decided to observe the effect of stilboestrol on him, and he was given 5 mg. daily for four weeks. When he was examined a few weeks later, he had definite breast swelling and pain, but asserted that his phantasies and erections and nocturnal emissions had ceased. Naturally, he had not been told what to expect. About four months later erections, nocturnal emissions and phantasies returned, but he stated that his phantasies were of intercourse with a woman. This sort of dramatic change in phantasy had not been seen in any other case, and was not accepted as factual. He was then on remand awaiting sentence.

#### Discussion.

These results indicate that intermittent administration of oestrogen has a very definite part to play in the over-all management of psycho-sexual disorders in males. It is obviously not a method of cure, but it is an effective method of control. It is most effective when the controlling agent is the patient's super ego or conscience.

When the controlling agent is not the patient's super ego, but is some sort of social pressure, be it the parents of the adolescent homosexual or a court, provision must be made for long-continued regular supervision. Even so, the psychiatrist will need all his skill to maintain a effective relationship with the patient, who would rather be enjoying himself in his particular perversion than taking pills to take the pleasure out of his life. In court cases the relationship is easier; but society is not effectively protected if the court releases the patient on his own bond to be of good behaviour and attend for treatment as required.

It is essential for public protection from repetition of these offences, that continued supervision by the penal department should be maintained. In Victoria, this is possible under the provisions of the *Probation and Parole Act* (1957). It is usual to recommend that clauses be included in the probation order that the individual should abstain from alcohol, attend for and accept treatment as directed, and visit the probation officer at specified intervals for a specified number of months or years. If he accepts these conditions, a prison sentence is suspended. The prisoner is informed by the court that if he breaks the conditions of his probation, he may be brought before court to be committed.

This system has two advantages: (a) the responsibility of reporting defaults lies with the probation officer and not with the psychiatrist; (b) the patient does not see the psychiatrist so much as an officer of the court, but in his true role.

When psychotherapy is carried out over a lengthy period, the triangular relationship of the patient with the psychiatrist and the probation officer may be used constructively. Because some psychiatrists may be reluctant to work with them, I wish to record that the Victorian probation officers with whom I have worked have without exception been completely helpful and constructive, and have contributed substantially to the readjustment of the men we have tried to help.

In conclusion, it is noted that the "Report of the Committee on Homosexual Offences and Prostitution" (the "Wolfenden Report") recommends (in section 211), that when the prisoner desires to have oestrogen treatment, he should be permitted to do so, if the prison medical officer considers that this would be beneficial as a treatment *per se* or as an element in other forms of treatment.

#### Summary.

With one exception, oral administration of oestrogen to 26 patients presenting with a variety of psychosexual disorders produced the anticipated effects. This form of treatment controls, but does not cure, the deviation of aim or object of the sexual drive. Treatment must be repeated at intervals if it is to be effective.

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### NUTRITIONAL AND DIETARY ASPECTS OF THE MELBOURNE CHILD GROWTH STUDY.<sup>1</sup>

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THE purposes and scope of the major investigation into child growth are set out in the paper "The Melbourne Child Growth Study", published in this Journal (Roche and Sunderland, 1958). The dietary study, one of the subsidiary projects of this major work, was commenced when the children were aged two years, and it is intended that it should be continued until they reach adulthood. The children are normal children of Australian parents, resident in the Melbourne area.

#### The Aim of the Dietary Study.

The aim is to investigate the nutrient intake and dietary form or pattern of each member of the group of approximately 60 girls and 60 boys throughout their growth period, and to correlate the results with the findings of the major work in order to determine whether their dietary habits have affected growth or nutritional state.

#### The Method of the Dietary Study.

A similar method of investigation was followed each year for the first three years. Recently, however, this has been changed, as the children have commenced full-time attendance at school. During the first three years, each mother and child visited the Growth Clinic for an annual interview, bringing with them a record of the food consumed during the preceding week. A quantitative assessment of average daily food intake was then made from the food record and as a result of questioning at the interview. Nutrient intake was calculated by the use of food composition tables (Osmond and Wilson, 1954), and the result was then compared with the standard of recommended level of nutrient intake (Wilson,

<sup>1</sup> Read at the A.N.Z.A.A.S. Congress, Adelaide, August, 1958.

1954). Also recorded were the type of dietary pattern, whether this included a high intake of refined carbohydrate or a preference for foods of soft texture, and any other feeding or related problem. It must be noted that some modifications of the food tables were used in the calculations. Averages were used for the food values of the group of green vegetables most commonly consumed, and similarly for root vegetables, deductions also being allowed for cooking losses in these two groups in respect of thiamine (25%) and of ascorbic acid (50%).

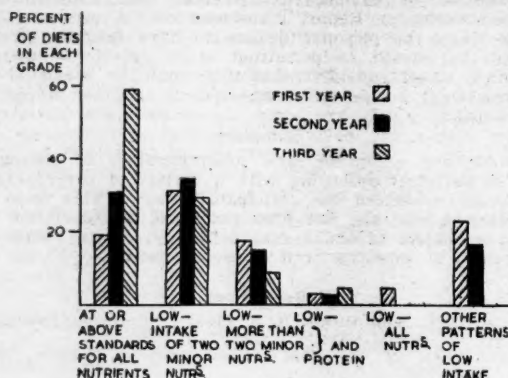


FIGURE I.

Girls—dietary grades for three years. Grading on a basis of low intake of selected nutrients compared with recommended levels of intake standards. Average age at commencement of study, approximately two years.

Fruits other than citrus were also grouped, and average figures were used for the nutrient content. Cooking losses were not deducted from any food other than the vegetable group. Approximately six months after the annual interview, a further week's diet record was sub-

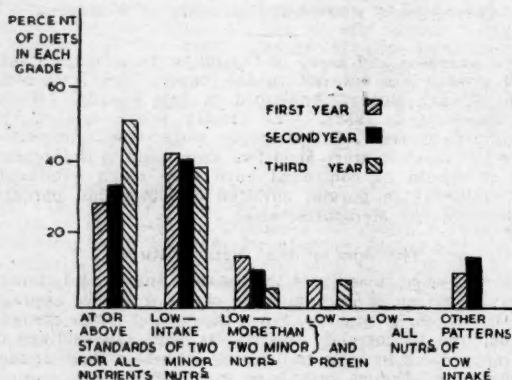


FIGURE II.

Boys—dietary grades for three years. Grading on a basis of low intake of selected nutrients compared with recommended levels of intake standards. Average age at commencement of study, approximately two years.

mitted for assessment, but an interview was not considered to be practicable. For this reason, these half-yearly results proved to be of limited value, as the information supplied on the diet record was not usually sufficient to allow reasonably exact calculation of intake.

#### Results for the First Three Years of the Dietary Study.

The grading of the dietaries on the basis of the extent of low intake of nutrients is shown in the histograms in Figures I, II and III.

The selection of grades is somewhat arbitrary, and does not indicate the degree of variation from the standards, but does suggest the satisfactory, the borderline and the unsatisfactory. The results are shown as group averages, although the investigation is conducted primarily in a manner which permits the development of each individual child to be followed throughout its growth period. It is of interest that for this group of selected children such a large proportion of the diets fail to reach the optimum or recommended level—that is grade (a).

Of the total group, only approximately 55% are recorded in this grade in the last year of the study reported in this paper, and lower proportions were recorded in the earlier years. The dietaries of the second group, grade (b), may or may not be adequate, but must be regarded as suspect or borderline. The remaining grades can be considered to indicate inadequate dietaries which may produce nutritional deficiency effects.

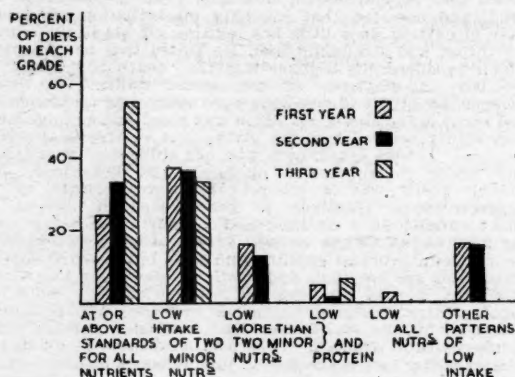


FIGURE III.

Total group—dietary grades for three years. Grading on a basis of low intake of selected nutrients compared with recommended levels of intake standards. Average age at commencement of study, approximately two years.

More interesting analyses are those shown in the histograms in Figures IV, V and VI, which indicate low intakes of individual nutrients. In any consideration of the results, it must be appreciated that the standards apply to children in groups of ages one to four years, then five to nine years. In actual fact, there must be a gradient or differences in requirement throughout the period studied. The standards also do not differentiate between recommended levels of intake for the two sexes. Our results show that, either application of the standards purely on the age group is not a satisfactory scheme, or the girls' dietaries fail to reach recommended levels more commonly than do those of the boys. This may simply be a direct relationship to the differences in body size and activity, and it is intended to analyse this finding further. Iron has been included in these tables simply as a matter of interest. It is appreciated that it is impossible to recommend a level of iron intake, but for the purposes of comparison intake was compared with the previously recommended standard (Osmond, 1948). The histograms indicate the great number of dietaries for which this standard was not achieved, but do not record the wide divergence from the optimum commonly found. Although biochemical tests have not been applied, the impression is gained from the clinical examinations that iron deficiency is not a common finding.

The most noticeable feature of these results, also found in other general surveys conducted in Australia, is that calcium and thiamine are the nutrients most commonly at low levels of intake. Approximately 40% of diets showed low levels of calcium intake, and 30% were low in thiamine. Somewhat unexpected was the finding that nicotinamide did not reach recommended levels in approximately 30% of the diets.

The histograms in Figures VII, VIII and IX indicate the number of dietaries in which there were low intakes of important food groups. These correlate well with the findings in respect of low intakes of individual nutrients. The changes during the course of the three years are probably the most interesting aspect in these analyses. A reduction in milk and an increase in meat consumption during the course of the second year of the study resulted

The majority of dietary inadequacies arose from child behaviour problems, especially in the earlier years. No attempt has been made to determine the cause of these difficulties, which were either refusal to eat certain foods or a generally poor appetite. In certain cases nutritional deficiencies may have caused the condition—for example, a low intake of thiamine affecting appetite—but generally they appeared as of psychological or of developmental

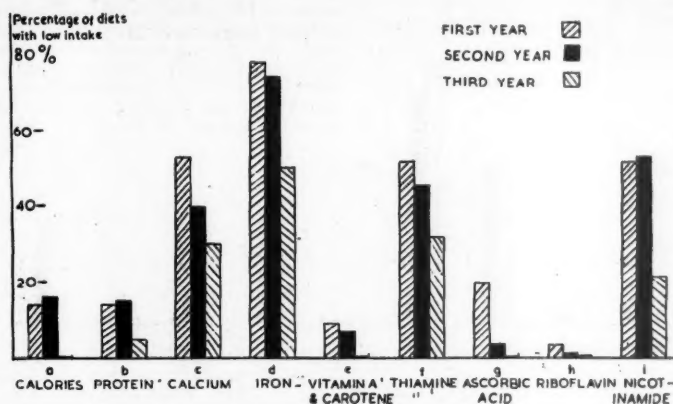


FIGURE IV.  
Girls—low intake of individual nutrients compared with recommended levels. Three years' study.

in a relative decrease in intake of certain nutrients, such as calcium, and an increase in others, such as iron and probably trace elements and other nutrients not assessed. At the same time there was an increase in the total amount of food consumed, although the same standards for level of intake applied for the group throughout this period. A major difficulty encountered was the general dislike for vegetables, either raw or cooked, and many

origin. Attendance at kindergarten, and probably the normal development of the children beyond this more assertive stage, resulted in improvement of the dietary habits. Approximately 20% of the children in the first year suffered from some type of organic disorder, mainly enlarged tonsils or allergies, which affected their selection of types of foodstuffs and in some cases resulted in low intake of specific nutrients.

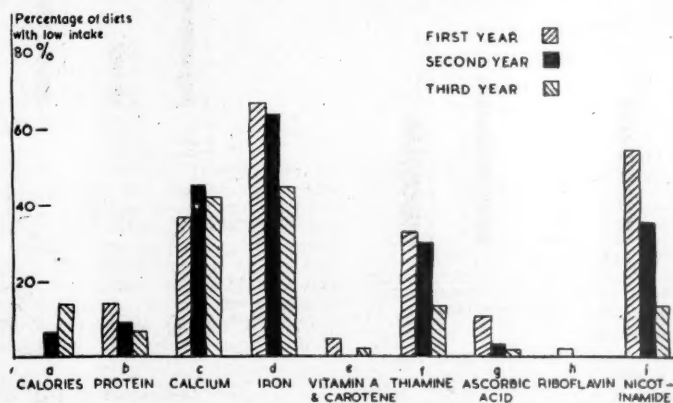


FIGURE V.  
Boys—low intake of individual nutrients compared with recommended levels. Three years' study.

mothers reported this problem. The importance of liver as a valuable source of nutrients was made very obvious by the assessments. When this foodstuff was consumed at reasonably regular intervals, vitamin intake reached or exceeded the recommended levels, particularly in respect of the fat-soluble group of vitamins. Very considerable quantities of fruit were eaten by the majority of the children, and on the average ascorbic acid intakes exceeded the present-day recommended levels.

A small percentage only of the mothers showed ignorance of or indifference to the diet and nutrition of their children.

The extent of vitamin supplementation (Table 1) is rather surprising. These children were all originally selected from those attending infant welfare centres since birth, and the earlier teachings of the mothers by the clinics may have been responsible for this practice. It is also possible that the present dietary investigations may



have had some influence, although in any nutritional advice offered the importance of dietary sources for nutrients was stressed.

There has been insufficient time available to do more than obtain factual material, but eventually the dietary findings will be correlated with those of the major study. It may, however, be more useful to attempt this

Table III shows the analysis of the number of affected tooth surfaces for the different age groups, each being subdivided into children consuming excess carbohydrate and those with no excess. It can be seen that the prevalence of caries increases generally with age, and that correspondingly the proportion of caries-free children diminishes to a total of approximately 18% at five years.

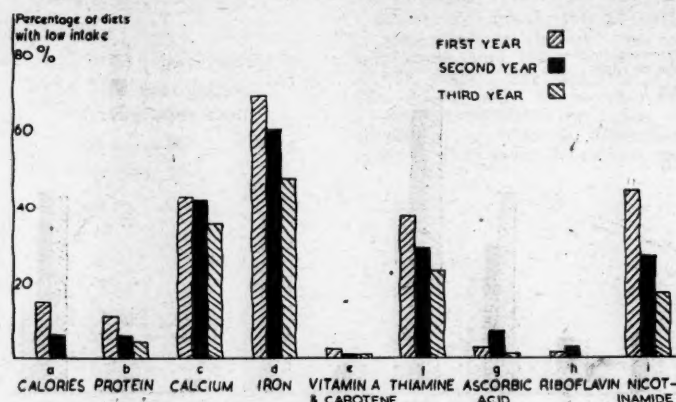


FIGURE VI.  
Total group—low intake of individual nutrients compared with recommended levels. Three years' study.

after some years have elapsed, as effects, if produced, may be the result of duration as well as of degree of dietetic abnormalities. However, one relationship has been investigated. This is a comparison of a group of the children in which the intake of refined carbohydrate appears excessive, and of those in which this appears normal, in

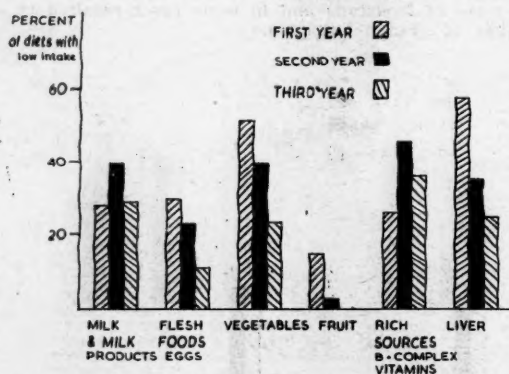


FIGURE VII.  
Girls—diets with low intake of important food groups.

respect of the incidence and extent of dental caries as determined during the regular dental examinations. The assessment of "excess" carbohydrate has been made on a somewhat arbitrary basis, and it is appreciated that these diets may be deficient or abnormal in other respects. Further investigation of this aspect must be done as a result of the findings concerning carbohydrate excess.

Table II shows the proportion of the children consuming diets classed as "excess carbohydrate" throughout the three years' period.

The incidence of caries is reported by means of the system of D.E.F.S. recordings—that is, assessment of numbers of decayed, extracted or filled tooth surfaces—rather than numbers of teeth affected.

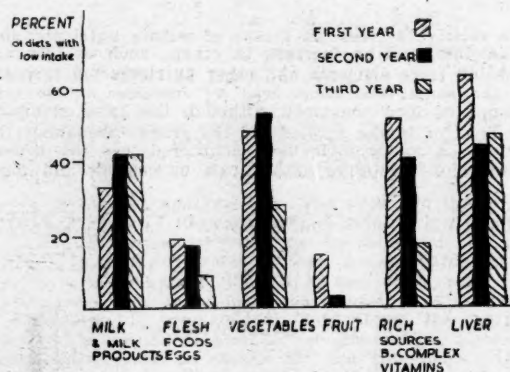


FIGURE VIII.  
Boys—diets with low intake of important food groups.

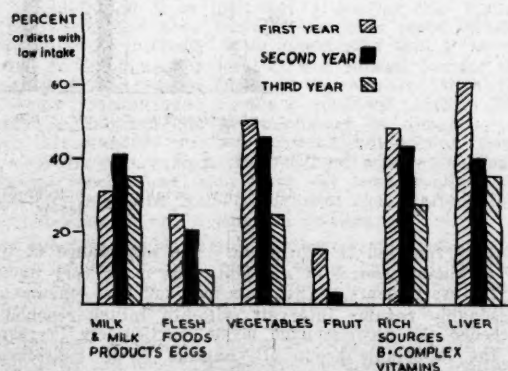


FIGURE IX.  
Total group—diets with low intake of important food groups.

The prevalence of caries according to carbohydrate status indicates that, firstly, prevalence in the carbohydrate excess group increases after the age of three years at about double the rate of the other group, the increments of the mean value being as shown in Table IV.

Secondly, the fall in the percentage of the caries-free children with age is much more rapid in the "carbohydrate excess" group. From near parity at age three years, it falls to only one-quarter of the other group at five years.

The prevalence of caries according to types of surfaces affected and carbohydrate status has also been analysed. The grinding or occlusal surfaces of molars have potential defects when they erupt, in the form of pits and fissured grooves which are susceptible to carious attack. As these are developmental in origin, lesions occurring in them have a somewhat different aetiological background from those occurring in the smooth surfaces of the teeth, although both are usually attributed to fermentation of carbohydrate in the lodgement areas.

TABLE I.  
Vitamin Supplementation.<sup>1</sup>

Annual Visits.	Girls.	Boys.
First visit—records not complete	—	—
Second visit .. .. .	24 (39.3%)	12 (21.1%)
Third visit .. .. .	22 (45.8%)	14 (31.1%)

<sup>1</sup> The total includes children who are given vitamin supplements regularly, or occasionally, as in winter time, or after illness.

Table V shows the mean values for the numbers of affected surfaces of the teeth in the two categories, and according to carbohydrate status. This shows the rapidly increasing contribution of smooth-surface caries in both groups, but especially in the carbohydrate "excess" group, in which it increases by age five years to a level significantly higher, clinically as well as statistically.

TABLE II.

Number of Diets in which the Intake of Concentrated and Refined Carbohydrate Foods Appeared to be Greater than is Considered Desirable.

Annual Visits and Half-Yearly Assessments.	Girls.	Boys.
First visit .. . . .	26 (45.6%)	31 (53.3%)
Half-yearly assessment ..	24 (54.4%)	26 (55.3%)
Second visit .. . . .	16 (26.2%)	10 (17.5%)
Half-yearly assessment ..	10 (28.6%)	6 (20.0%)
Third visit .. . . .	10 (20.8%)	11 (24.4%)

The validity of differences between groups can be demonstrated statistically only at the age of five years. A larger group of children would be needed to establish that the differences at earlier ages are real and not merely due to chance. However, the uniformity of pattern throughout the analysis of the prevalence of caries conveys a strong impression that other surveys of a like nature would yield similar results. It can be concluded that the survey reveals a consistent finding of higher prevalence of caries associated with excess carbohydrate in the diet.

#### Summary and Conclusions.

A dietary study of a group of 120 children over a period of three years has shown that, although there is an upward nutritional trend, only approximately half the children consume diets which meet recommended levels of intake, a further 30% of the diets are borderline in this respect, and the remainder are poorly-balanced, inadequate diets.

Calcium, thiamine and nicotinamide were the nutrients most commonly found to be below recommended levels of intake. Approximately 70% of the children's diets failed to meet the previously recommended levels of iron intake. The major causes of low intake of food groups or nutrients

TABLE III.

Growth Study Children: Numbers of Tooth Surfaces Affected by Dental Caries, by Age, According to the Carbohydrate Status of the Diet.

Number of Affected Tooth Surfaces.	Age Three Years.		Age Four Years.		Age Five Years.	
	Excess. CHO *	No Excess.	Excess. CHO *	No Excess.	Excess. CHO *	No Excess.
0	56	28	20	20	7	14
1	5	1	10	—	7	1
2	9	2	5	6	4	2
3	2	2	4	1	1	5
4	4	—	10	1	6	—
5	2	—	6	—	3	3
6	2	—	7	1	7	1
7	—	—	5	2	4	—
8	—	2	1	1	4	4
9	—	—	1	—	3	1
10	—	—	4	—	4	2
11	—	—	1	—	4	—
12	—	—	2	1	4	1
13	—	1	—	—	3	1
14	1	—	3	—	8	—
15	—	—	1	1	1	—
16	—	—	—	—	1	1
17	—	—	—	—	1	—
18	—	—	—	—	—	—
19	—	—	1	—	—	—
20	—	—	—	—	2	—
21	—	—	—	—	—	—
22	—	—	—	—	—	—
23	—	—	—	—	2	—
24	—	—	—	—	1	—
25	—	—	—	—	—	—
26	—	—	1	1	—	—
27	—	—	—	—	—	—
28	—	—	—	—	—	—
29	—	—	—	—	1	—
30	—	—	—	—	—	1
Total number of children ..	81	36	82	35	79	38
Percentage caries-free .. ..	69.1	77.8	24.4	57.1	8.9	30.8
Mean number of affected surfaces	1.00	1.11	4.56	2.86	8.52	5.00
Standard error	0.236	0.471	0.535	0.873	0.73	1.04

\* Carbohydrate.

were behaviour or feeding problems, although approximately 20% of the children suffered from some disability, such as enlarged tonsils or allergies, which affected their dietary habits.

TABLE IV.

Prevalence of Caries.	"Carbohydrate Excess" Group.	Others.
Prior to age three years .. . . .	1.00	1.11
Increment between age three and four years	3.56	1.74
Increment between age four and five years	3.98	2.14

A positive correlation has been shown between the prevalence of dental caries and consumption of dietaries in which there is considered to be an undesirable amount, or type, of foodstuffs containing refined carbohydrate.

TABLE V.

Mean Caries Prevalence, by Age, According to Type of Tooth Surface Affected (117 Children at each Age).

Time of Estimation of Caries Prevalence.	Pit and Fissure Surfaces.		Smooth Surfaces.	
	Carbohydrate Excess.	No Carbohydrate Excess.	Carbohydrate Excess.	No Carbohydrate Excess.
(Prior increments)	(0.53)	(0.89)	(0.47)	(0.22)
At age three years	0.53	0.89	0.47	0.22
(Increment) ..	(2.14)	(0.97)	(1.42)	(0.78)
At age four years	2.67	1.86	1.89	1.00
(Increment) ..	(1.39)	(0.69)	(2.57)	(1.45)
At age five years	4.06	2.55	4.46	2.45

### Acknowledgements.

We wish to record our appreciation of the cooperation and assistance of Dr. A. Roche, Department of Anatomy, University of Melbourne, Director of the Child Growth Study, who has made it possible for us to conduct the dietary survey and present the findings as a separate report, and to the staff of the Growth Clinic for their assistance. We are grateful to Dr. N. H. Andrews, Director of Child Health, Dental Division, State Department of Health, and to Mr. Jago, Dentist to the Growth Clinic, of the same department, for the information concerning the dental examination of the children, and for the statistical and other analyses concerning the incidence of dental caries in relation to carbohydrate content of the diets. We also appreciate the action of the H. J. Heinz Company in providing a monetary grant towards the costs involved in conducting the survey.

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### MEDICAL REHABILITATION—SOME WIDER ISSUES.<sup>1</sup>

By R. I. MEYERS,

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WHEN I accepted your invitation to speak on "medical rehabilitation", I did so with some trepidation, because this rostrum is graced so often by senior colleagues and distinguished visitors. Nevertheless I welcomed the opportunity to discuss this important aspect of medicine with which I have had the good fortune to be associated. Not a fraction of "the procrastinator's easy optimism" was mine, and the essence of my task in the intervening months has been to define the scope of this talk, and to give some clarity of expression to the relevant facts and opinions.

They will be disappointed who hoped that I could relate of rehabilitation a story comparable with, say, that of "Sir Henry Dale's Contribution to Physiology" (Adrian, 1955), or again who expected much, if any, discussion on matters such as the use and abuse of physiotherapy, or the scope and limitations of occupational therapy, and so on. I believe that some wider issues may be discussed in this hospital which already has pioneered so much in this sphere and these I shall discuss briefly, together with two specific matters—the desiderata of the hospital rehabilitation department and its method of operating.

Rehabilitation is as old as the art of medicine, but is new as an organized section of medical and hospital practice, and herein lies the source of some of the confusion and controversy that at times arise when this topic is discussed. Incidentally, I chose the title from a number of synonyms offered, so as to have the opportunity to say that it is a somewhat redundant expression like "remedial therapy". In our context the term "rehabilitation" is adequate and, for some, can be a convenient abbreviation for "physical medicine and rehabilitation".

Rehabilitation is no more a narrow specialty than is internal medicine or general practice. Properly practised

it is a branch of medicine, an integral part of the whole, so that anatomy, physiology, pathology and psychology, in their ancient truths and recent advances, serve it equally well as they also serve internal medicine, general practice and most of the specialities.

I propose, then, to deal with these four facets of our topic: (i) the background from which rehabilitation emerged, and its relation to current medical and hospital practice; (ii) the desiderata for a hospital rehabilitation department; (iii) two questions concerning its method of operating, to each of which I believe this paper may be expected to provide an answer; (iv) rehabilitation in relation to medicine and social policy.

### The Background.

In earliest times, physical fitness was everywhere a *sine qua non* for survival. As the races spread from the cradle of civilization, they shared, or rediscovered, certain knowledge, including the value of athletic and other exercise, and of rubbing and moving stiff and weary parts of the body. A knowledge of "massage and movement", as these latter activities were later termed, reached Britain by an apparently circuitous route, and then lay for generations hidden by the secrecy of the therapists of past generations.

By the beginning of the present century, many of the great and grand fathers of modern medicine were at their prime, such as Sir Charles Sherrington, Sir William Gowers, Sir Victor Horsley and Sir Almroth Wright. Medicine was seeking the bacterial cause of illness, and men like Dale and Ehrlich in their laboratories advanced into unknown regions, and turned the passes that led to immunology, chemotherapy and hematology. (It is not to be wondered that those who dabbled with massage and movement and joints and muscles, to the exclusion of an adequate knowledge of normal and morbid processes in the body and of their management, brought a disrepute to their trade or quackery.)

Beside the fascinating search for truths and their application at the bedside stalked medicine's disquieting shadow, small and not so readily discernible at first, but relentlessly growing as society evolved, and now so large that it cannot be ignored. This shadow was formed by the social implications of medical practice. Professor Crew (1955) had this to say in regard to it:

[Medicine] had to add to its great store of clinical knowledge new knowledge that could be applied to the health of the people as a whole. The concepts and methodology of a new disease—preventive and health-promotive medicine, had to be elaborated.

This state of affairs came about as rehabilitation emerged from the closing stages of the Second World War, with the renaissance of the practices of Robert Jones—reborn of a compelling necessity to lend an energetic and scientific management to the convalescence and return to suitable normal activity of the ill and injured serviceman.

Soon after the war, in those countries with large populations and a soundly based system of medical practice, such was the need that rehabilitation arose as a separate section of organized medicine, set, naturally enough, in the pattern of its wartime precursor. Since then many developments and experiments have been made in this new field, and many committees have deliberated on the problems which have arisen.

Recently, the Committee on Rehabilitation of the American Medical Association, under the chairmanship of one of the pioneers and doyens of this field, Dr. Frank H. Krusen of the Mayo Clinic, concisely summarized its views thus (De Forest, 1957):

Success in rehabilitation is dependent then upon comprehensive care including:

- (1) Medical and surgical diagnosis and treatment which must continue beyond the end of the "acute stage" of the disease or injury to the point of maximal reduction of physical or mental disability.
- (2) social service.

<sup>1</sup>Read in the seminar series, Sydney Hospital, on April 16, 1958.



- (3) vocational counselling and vocational training (where possible), and  
(4) job placement.

There would have been nothing really new about this to Sir Robert Jones, who a generation earlier (1925) said:

The object of treatment is the restoration of function with the least risk to the patient . . . to them [the patients] and to their families it is of paramount importance that they leave hospital with function restored.

His remarks, of course, held particular clinical significance, and were directed to the surgeons who treated

but it must be appreciated that it must be carried out from within a medical environment for an individual patient, by a suitable clinician who has the various facilities readily at his disposal. These views are largely those of Krusen and other experts (personal communications; B.M.A. Memorandum on Rehabilitation, 1954).

By and large, adequately staffed and organized rehabilitation departments are at present lacking from Australian hospitals. It should not be beyond the economic capacity of the country, or the will of well-advised boards of management of hospitals (especially the teaching hospitals), to establish in each a full-time department of physical medicine and rehabilitation. That of the Prince of Wales Hospital at Randwick is, from what I can gather (and despite its incompleteness), one of the oldest and biggest and, may I add, the least publicly advertised, of any in the country.

#### The Desiderata.

The department is under full-time medical direction. It differs from other departments because of the extent of its necessary, medically supervised, extramural activities; and because ancillary staff of this department are actively engaged in personal contact with the patient, of a particular type and to a particular degree; and because of the need for enlightened medical supervision of all the relevant activities—matters which are unique in hospital practice only to the extent of their necessary concentration.

The department takes over and incorporates the physiotherapy and occupational therapy units. Not only is this considered desirable (by overseas authorities) for reasons which can be best termed professional, but it is also necessary for reasonable economy and efficiency of operation of the rehabilitation department and hospital. The physiotherapy unit includes gymnasium areas. Here specific and general, individual and group, strengthening and functional, exercises are carried out under adequate supervision. In the rehabilitation department there is likely to be less unnecessary use of various heating machines, less unduly prolonged or pointless exercise—and the reason for this lies in the skill and ability of the medical staff of the department in prescribing the physiotherapy as part of a programme that has as its object the achievement of a realistic social or vocational goal for the particular patient.

The occupational therapy unit includes, *inter alia*, a workshop area. The exact details of the nature of this area depend upon the experience of the director of the department, and also to some extent upon that of both the chief occupational therapist and the foreman instructor helping to staff this section.

Other essential features include several small educational classroom areas, adjoining or nearby offices for the heads of the ancillary sections (i.e., therapy technicians, almoner, vocational counsellor and placement officer), suitable common and change rooms for the staff, secretarial facilities and facilities for keeping certain records, and one or more conference rooms for regular rehabilitation conferences. (The rehabilitation conference is to this department what the bedside conference of the ward round is to the customary medical unit.)

If adequate attention is to be given to training towards self-care for the older or more disabled patients, a male and a female ward are needed. In these wards, patients receive specific training which is intensive and planned for each individual, the objects being to bring the patient as quickly as possible to the stage of maximum reduction of disability and maximum self-dependence compatible with a realistic social (or vocational) goal. By this means premature discharge, leading to incomplete convalescence and unnecessary medical or social hardship and readmission to hospital, is avoided.

At a later stage, dormitory or hostel-type accommodation will be needed (as exists in the University of Minnesota Teaching Hospital), to bring the facilities of the department within the reach of certain metropolitan

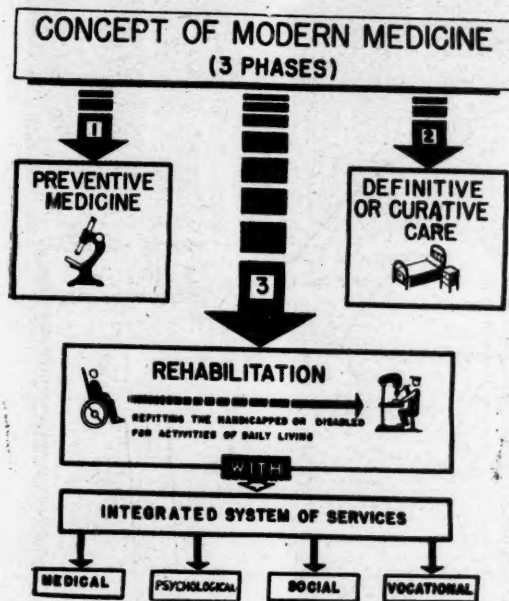


FIGURE 1.

The concept of rehabilitation (with acknowledgements to the University of Michigan Medical Centre, Ann Arbor, Michigan). Rehabilitation is not the third of separate consecutive "phases" of medical care. Rehabilitation is a process which operates in some manner for all patients, commencing at the first point of contact of the patient and his doctor. The specialized facilities of a rehabilitation department are required for only a relatively small proportion (10% to 25%) of the patients of a hospital. Only if adequate staff, area and organization are available can these necessary facilities exist. The specialization involved is one of professional knowledge and experience, on the one hand, and of "business economy" in hospital practice, on the other. The community as a whole is concerned in rehabilitation in many ways; but rehabilitation can be carried on adequately only under direct and detailed medical supervision—i.e., ideally in a medical environment, and in the metropolis necessarily in teaching hospitals.

fractures in the teaching hospitals of that day, and as you will agree, they apply now with equal force generally.

The crux of the matter, as Dr. Krusen's committee stated, is comprehensive care. Where this is unavailable there are gaps in medical and hospital practice, and because of these gaps, many patients are in dire straits: in brief, too ill or disabled to be well or earning; not ill enough to warrant hospital treatment, or unable to afford the cost of reaching and purchasing the necessary care; or merely unable to be restored to a suitable normal activity because the few extra facilities needed for this new type of comprehensive care are not available.

No amount of "coordinating" can fill these gaps. There is both scope and need for a certain type of coordination;

patients needing them, and unable to travel as out-patients, and not warranting hospital-type in-patient care.

For efficiency and economy of operation, the whole department should be unified architecturally, and must be located within ready reach of patients and medical staffs of all sections of the hospital.

#### Summary.

In brief, then, the needs are: (i) skilled medical staff with a full-time director; (ii) space—adequate in area, unified and accessible; (iii) ancillary staff and certain equipment; (iv) organization. I would also emphasize the following two points (Meyers, 1957):

care—that is, as an integral part of the hospital, able to share in the automatically available consultative services, radiological services, laboratories, operating theatres etc. Despite doubts in certain quarters, such a rehabilitation department is yet able to create its own "therapeutic community atmosphere". It is also especially fitted to ensure that the patient's "third phase of medicine" not only commences without undue delay, but remains under medical control.

#### The Two Questions.

It would not be unreasonable to expect that this seminar may consider these two questions: (i) What patients benefit from rehabilitation within a rehabilitation depart-

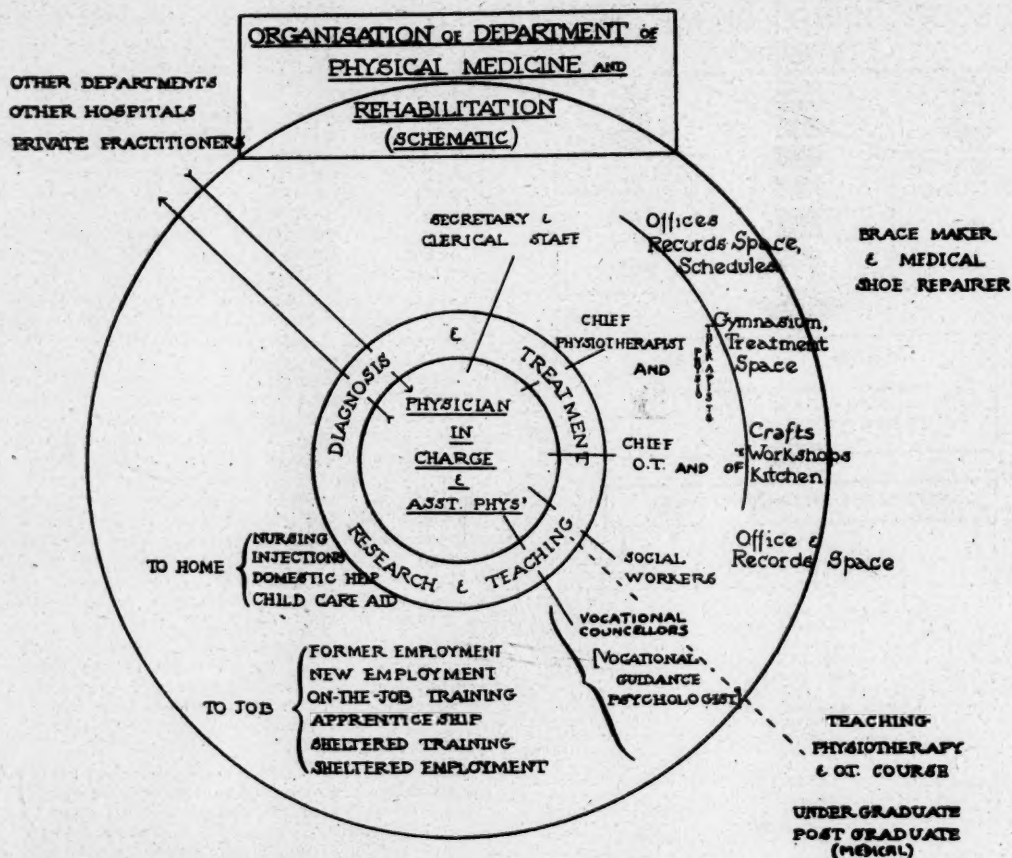


FIGURE II.

The hospital rehabilitation department (schematic). This diagram indicates the desiderata for the hospital rehabilitation department responsible for the three functions of teaching, research and patient care. Not only must the department be unified and organized as a departmental organization headed by a single individual, but it must be integrated with the hospital.

First, it is because so great a proportion of the patients have some chronic illness or disability involving systems including the locomotor system, that the department must be based upon and must incorporate the physiotherapy and occupational therapy units—that is, that the rehabilitation department (except in the case of severe mental illness, tuberculosis, deafness, blindness) can function adequately only when it is in effect a department of physical medicine and rehabilitation. This is an important fundamental point which seems to have escaped the notice of some.

Secondly, because persons undergoing rehabilitation are patients and need to remain under medical care and supervision, the department functions most efficiently and economically when it functions in an environment which provides the desiderata for medical

ment? (ii) How does rehabilitation operate for these patients?

My answers, in outline, are as follows.

#### The Patients.

With regard to the first matter, and with certain notable exceptions, these are the categories of patients concerned: (a) Those with some chronic or recurrent illness or disability, whose resources—physical, mental, educational, social, vocational—are meagre, especially if they are so meagre as to jeopardize the patient's opportunity to obtain the necessary comprehensive care. (b) Those patients with severe disabilities for whose treatment the practitioner lacks the necessary facilities (and

this category includes private and insurance patients).  
(c) Certain patients whose illness or injury will necessitate cessation or change of employment, or of education.  
(d) Certain patients with multiple disabilities.

These categories are not mutually exclusive. Various surveys have shown that from 10% to 25% of patients in large hospitals need the facilities of a rehabilitation department.

#### The Method.

Firstly, it should be recalled that contact with the patient occurs only when the consultant or practitioner concerned refers the patient. In general, there are four

the relationship of the patient—the "whole man"—to his environment, physical, social, vocational, his "*milieu extérieur*". On the basis of this appraisal, and with the help of the patient if possible, a realistic social or vocational goal must be discerned—i.e., realistic with reference to the comprehensive diagnosis. Again, by no means is shrewdness of appraisal the unique facility of those of this section of the hospital; but, to some extent to a unique degree, such shrewdness of appraisal requires to be exercised as a routine.

**Specific Treatment.**—This includes, in addition to any indicated surgical or pharmacological measures, various types of exercise—done singly or in groups, to strengthen muscles, to increase endurance (of the part of the whole)—and/or participation in occupation as exercise to aid in assessment of the patient's physical or mental performances, and purposeful vocational counselling. Finally, prior to the patient's discharge from hospital, adequate instruction in self-care, including self-applied physiotherapy, must be given.

**Extramural Actions.**—These concern education, vocational training, job finding, and social, domestic and home-nursing assistance, under medical supervision and in cooperation with the local practitioner concerned.

**Comment.**—The point to note is that all these operations are coordinated or, if you like, controlled and integrated by the patient's own clinician, who is able to marshal readily at least some of the necessary resources according to the requirements of the patient's medical condition or residual lesions and abilities.

#### Medicine and Social Policy.

It must be realized that a practitioner's ability to provide comprehensive care depends on only two factors: (i) the ability of doctor and patient to make and maintain contact; (ii) the adequacy of the facilities necessary for this care which are at the disposal of that practitioner. If this care cannot be provided, the patient's well-being will suffer. That is obvious; and as time goes on the good name of the profession must suffer also.

I wish to quote from Sir Robert Jones's "Lady Jones Lecture" from which I quoted earlier; it was entitled "Crippling due to Fractures: Its Prevention and Treatment". His remarks apply (as far as concerns rehabilitation) to the majority of patients for whom our present hospital and medical facilities cannot provide the necessary comprehensive care. He said:

Let me emphasize that the success in the treatment of fractures during the later phases of the war was due to expert supervision, simplicity of apparatus, team work, segregation, and appropriate after-care. These are the lessons the war taught us. Are we going to apply them or are we to revert to the old bad way? Upon an answer to this question much depends, both in respect to the reputation of our teaching hospitals and to that of our profession as a whole.

This is true for rehabilitation now, as it was for the treatment of fractures in 1918. It must also be realized that the present needs of rehabilitation cannot be met by vain attempts to "coordinate", for such coordination as is needed can take place only when gaps extant in medical and hospital practice are filled.

I should like to have ended with that triumphant challenge of this great man; but there is one more point to be made. It deals with the widest implications of medicine and social policy, and rehabilitation is concerned here significantly. I take again the words of Professor Crew (1955):

... it is not improbable that in the future the ethic of the medicine of the individual and that of the medicine that is applied to the affairs of society as a whole, may come to differ, to make even greater the divergence in respect of their philosophies, that even now distinguishes them. The ethic of the former belongs to an age that is swiftly passing, and is becoming inappropriate to the circumstances of a world in which the major quest is for social amelioration rather than for personal continuance.

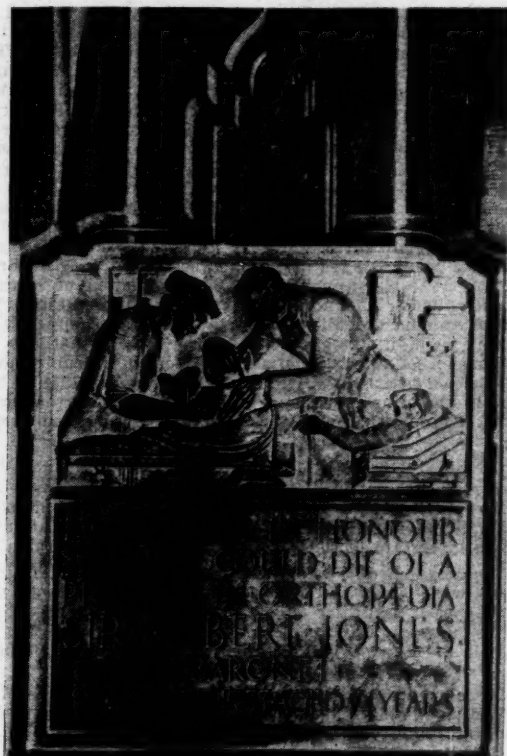


FIGURE III.

Memorial to Sir Robert Jones; photograph taken from the Official Handbook of the Liverpool Cathedral, and reproduced with permission. Sir Robert Jones's "lessons of the war" apply also to rehabilitation in modern medical and hospital practice. It must be realized that the lessons were not really forgotten, but the seed did not flourish, for the soil lacked a trace element—a reorganization of, and addition to, hospital practice—and so it is today. We do well to note this essential tenet, in paying homage to Sir Robert Jones.

steps: (a) diagnosis, (b) appraisal, (c) specific treatment, (d) extramural measures.

**Diagnosis.**—"Rehabilitation cannot be divorced from diagnosis and specific therapy." (Lowman, 1956.) In rehabilitation the emphasis is on a thorough and complete diagnosis of all disabilities. I do not imply that skill in diagnosis is the prerogative of any one group. But it is of routine (and to a degree unique) concern, in this section of the hospital, to know, for instance, if the referred patients now beginning to recover from compound fractures of the tibia and fibula also have other disabilities—e.g., defective vision, recurrent bronchitis, peptic ulcer, hypertension, muscular dystrophy, anxiety neurosis and so on.

**Appraisal.**—Based upon this comprehensive diagnosis, as shrewd an appraisal as possible must be made of



The major obligation of medicine in increasing measure will be towards society, and medicine will continue to be one of the most potent instruments that society will use for the achievement of its aims. It will be for medicine, along with the other social sciences, continually to examine and to define the changing and enlarging needs of socialized man.

However, I believe that as long as we maintain intact both honesty of purpose and professional freedom, the ethic of medicine will remain inviolate; and I believe that in this present day, and in the future, medicine can meet "the changing and enlarging needs of socialized man", but that it can do so only by satisfying the need of man, our patient, for comprehensive care. This comprehensive care is not available to him, to an extent which is becoming alarming to our enlightened leaders and teachers, as it is to politicians and their economists.

It would appear that in rehabilitation lies one of the most effective means at medicine's command to do for certain patients in need what we would do for ourselves, and thus simultaneously to satisfy the needs of society and, in the words of Robert Jones, to uphold both the reputation of our teaching hospitals and that of our profession as a whole.

#### Acknowledgements.

I wish to thank the Department of Social Services for permission to publish this paper. The opinions expressed are my own, and do not necessarily reflect the policy of the Commonwealth Department of Social Services and of the Commonwealth Rehabilitation Service of this Department.

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#### SERUM VITAMIN B<sub>12</sub> LEVELS IN LIVER DISEASE.

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RAISED serum levels of vitamin B<sub>12</sub> may occur in liver disease, particularly in the presence of parenchymal cell damage and necrosis (Jones and Mills, 1955; Rachmilewitz *et alii*, 1956, 1958; Meynell *et alii*, 1957; Mackay *et alii*, 1957). This paper reports assays of vitamin B<sub>12</sub> in serum in various types of liver disease, with correlations between serum vitamin B<sub>12</sub> levels and clinical status, biochemical findings and histological changes in the liver.

#### Cases Studied.

Data were obtained in six categories of liver disease as follows.

1. Active chronic hepatitis (Saint *et alii*, 1953). This group comprised cases of post-hepatic cirrhosis, post-necrotic cirrhosis and lupoid hepatitis (Mackay *et alii*, 1956), and denoted progressive or relapsing hepatitis, which sometimes followed acute viral hepatitis, but often appeared *de novo*.

2. Nutritional hepatitis and cirrhosis. This comprised diffuse liver disease associated with alcoholism; alternative terms would include alcoholic or Laennec's or portal cirrhosis. Fatty infiltration and "septal fibrosis" (Popper and Zak, 1958) were prominent features of the liver biopsy.

3. Acute viral hepatitis. Diagnoses were made on clinical and laboratory findings. Some of the patients were in the convalescent phase when tested, and all recovered.

4. Obstructive jaundice.

5. Metastatic neoplasm of the liver.

6. Miscellaneous.

#### Methods.

Vitamin B<sub>12</sub> in serum was assayed by the method of Hutner *et alii* (1956), using *Euglena gracilis* as the test organism. Sera were stored at -20° C. prior to assay. The level was assayed in three dilutions of serum. With high serum vitamin B<sub>12</sub> levels, less accuracy was obtained than with normal or low levels. The free vitamin B<sub>12</sub> serum level is that measured on unheated serum. When serum is heated to 100° C., the proteins are denatured and vitamin B<sub>12</sub> bound to them is released. Assay of the treated serum gives the total vitamin B<sub>12</sub> content. The normal ranges for total and free serum vitamin B<sub>12</sub> levels in our laboratory were found to be 200 to 700  $\gamma\gamma$  per millilitre and 0 to 160  $\gamma\gamma$  per millilitre. Plasma glutamic oxalacetic transaminase was assayed by a modification (E. N. O'Brien and A. J. Goble, unpublished) of the method of Karmen *et alii* (1955); the normal range is 10 to 25 units. The serum gamma globulin level was estimated chemically by a zinc turbidity technique (Welden, 1953); methods for estimation of serum albumin and serum bilirubin levels have been described previously (Owen *et alii*, 1958). The serum globulins were analysed by paper electrophoresis with photometric quantitation of the dye-stained strip.

#### Results.

##### Serum Vitamin B<sub>12</sub> Levels in Liver Disease.

Serum vitamin B<sub>12</sub> levels and other laboratory data for all patients are presented in Table I. Serial vitamin B<sub>12</sub> levels in certain of the patients are presented in Table III.

In active chronic hepatitis the total serum vitamin B<sub>12</sub> level was raised in 17 of the 20 cases, and was over 1350  $\gamma\gamma$  per millilitre in six cases. The mean level was 1372  $\gamma\gamma$  per millilitre. The free vitamin B<sub>12</sub> level was raised in nine of 17 cases tested, the mean level being 314  $\gamma\gamma$  per millilitre.

In chronic nutritional hepatitis the serum level of vitamin B<sub>12</sub> was high in seven of the 14 cases; mean levels for total and free serum vitamin B<sub>12</sub> were 866  $\gamma\gamma$  per millilitre and 96  $\gamma\gamma$  per millilitre respectively.

In acute infectious hepatitis assays were performed on sera from seven patients. Vitamin B<sub>12</sub> levels were moderately elevated in three and highly elevated in two cases; five of these patients were in the convalescent phase. The very high level in Case 41 (5000  $\gamma\gamma$  per millilitre) fell with clinical recovery.

In extra-hepatic biliary obstruction, the four patients with obstructive jaundice without evidence of liver damage included three (Cases 42, 43 and 44) with gall-stones and one with obstruction of the common bile duct by metastatic tumour (Case 45); two had slightly elevated serum levels of vitamin B<sub>12</sub>, and two had normal levels; the mean level (795  $\gamma\gamma$  per millilitre) was just above the upper limit of the normal range.

In three patients biliary obstruction was complicated by diffuse hepatic necrosis, and the serum vitamin B<sub>12</sub> level was very high. Case 47 has been reported previously as being one of obstructive hepatic necrosis due to an impacted gall-stone (Mackay *et alii*, 1957); biliary obstruction was due to cancer of the pancreas in Case 46 and to cancer of the left hepatic duct in Case 48. In Case 47 a fall to a normal serum level of vitamin B<sub>12</sub> followed relief of the obstruction.

In metastatic neoplasm of the liver, five of the six cases in this group had raised levels. This group had the highest mean serum level for vitamin B<sub>12</sub> (2175  $\gamma\gamma$  per millilitre).

<sup>1</sup> Working with the aid of a grant from the National Health and Medical Research Council of Australia.

TABLE I.  
Serum Vitamin B<sub>12</sub> Levels and Laboratory Findings in 57 Cases of Liver Disease.

Case Number.	Diagnosis. <sup>1</sup>	Clinical Status. <sup>2</sup>	Serum Bilirubin Level. (Milligrammes per 100 ml.)	Serum Albumin Level. (Grammes per 100 ml.)	Serum Gamma Globulin Level. (Grammes per 100 ml.)	Plasma Glutamic Oxalacetic Transaminase. (Units.)	Liver Cell Damage. <sup>4</sup>	Total Serum Vitamin B <sub>12</sub> . (γγ per ml.)	Free Serum Vitamin B <sub>12</sub> . (γγ per ml.)
1	A.C.H.	+	0.4	3.3	2.6	50	+	900	400
2	A.C.H.	+	0.4	5.9	0.9	9	—	940	400
3	A.C.H.	—	1.0	2.0	1.3	— <sup>3</sup>	++	1750	410
4	A.C.H.	++	—	—	—	82	—	1940	356
5	A.C.H.	+++	2.2	2.0	1.6	65	0	1340	420
6	A.C.H.	+++	0.4	2.9	1.8	21	+	1336	—
7	A.C.H.	+++	14.8	2.5	3.6	78	+	730	20
8	A.C.H.	++	0.4	2.4	1.7	30	++	1000	470
9	A.C.H.	+	0.4	3.8	2.4	—	—	1946	50
10	A.C.H.	+	0.4	3.9	1.9	30	0	1170	500
11	A.C.H.	+++	2.2	1.9	—	42	—	749	108
12	A.C.H.	+++	0.5	3.4	2.2	45	—	450	20
13	A.C.H.	+	1.5	2.9	—	28	—	464	20
14	A.C.H.	+++	1.6	2.1	—	136	0	1863	—
15	A.C.H.	+++	15.6	1.8	2.2	19	—	4000	80
16	A.C.H.	+++	5.8	2.7	2.7	—	—	1200	—
17	A.C.H.	+++	5.6	2.6	2.7	—	—	1180	656
18	A.C.H.	++	6.0	2.4	4.4	—	—	530	—
19	A.C.H.	+	6.8	2.5	—	48	—	1336	—
20	A.C.H.	+++	—	2.0	3.0	950	—	2744	1600
21	N.H.	+	0.4	3.6	1.8	42	—	1248	40
22	N.H.	+	—	—	—	33	—	1682	80
23	N.H.	+	0.4	4.4	1.6	400	—	802	150
24	N.H.	++	1.0	3.1	—	290	—	424	50
25	N.H.	++	0.4	4.6	0.7	—	+	1312	288
26	N.H.	+++	—	—	—	—	+	430	—
27	N.H.	++	1.4	3.1	2.0	—	—	517	40
28	N.H.	+	1.5	3.1	2.2	65	—	1300	—
29	N.H.	+	5.6	3.6	1.1	12	—	1098	320
30	N.H.	+	1.1	3.7	1.2	16	0	1388	64
31	N.H.	++	0.4	2.7	1.3	—	—	1276	90
32	N.H.	++	1.2	3.1	—	33	—	1208	—
33	N.H.	++	1.4	2.2	1.4	—	0	546	40
34	N.H.	+++	1.8	3.3	1.2	—	—	340	—
35	A.I.H.	+++	11.0	4.3	—	26	—	356	—
36	A.I.H.	++	—	—	—	69	++	363	20
37	A.I.H.	+	0.4	3.8	1.3	—	—	1400	—
38	A.I.H.	+	0.4	4.0	1.2	30	—	624	100
39	A.I.H.	++	0.4	5.1	0.9	27	—	1232	—
40	A.I.H.	++	16.0	4.0	1.0	59	++	1030	—
41	A.I.H.	++	1.0	4.6	1.5	—	—	940	136
42	O.J.	+	2.6	3.6	—	—	—	428	40
43	O.J.	+	5.2	3.8	—	—	—	914	67
44	O.J.	+	2.7	3.6	—	—	—	680	80
45	O.J.	++	6.3	2.5	—	—	—	1953	740
46	O.H.N.	+++	6.8	4.4	—	32	++	5000	420
47	O.H.N.	+++	17.2	3.2	0.9	—	—	780	400
48	O.H.N.	+++	9.0	3.4	—	26	+++	1288	900
49	M.C.	+++	3.5	3.6	—	82	—	453	—
50	M.C.	+++	5.0	2.8	1.0	—	—	635	100
51	M.C.	+++	7.0	2.7	0.7	—	—	808	100
52	M.C.	++	0.4	2.9	0.8	107	+++	3500	1730
53	M.C.	++	0.4	2.4	—	81	—	7040	250
54	M.C.	++	9.8	3.4	—	59	—	1381	624
55	M.	+	—	4.1	—	—	—	1578	680
56	M.	+	—	—	—	45	—	2476	1640
57	M.	+	—	—	—	—	—	2060	436
								740	100
								4960	—
								1216	—
								1276	800
								718	20
								256	40

<sup>1</sup> A.C.H., active chronic hepatitis; N.H., nutritional hepatitis; A.I.H., acute infective hepatitis; O.J., obstructive jaundice; O.H.N., obstructive hepatic necrosis; M.C., metastatic cancer; M., miscellaneous.

<sup>2</sup> The clinical severity of the illness was arbitrarily graded + to +++.

<sup>3</sup> "—" means not estimated at time of vitamin B<sub>12</sub> assay or not performed.

<sup>4</sup> The degree of liver cell damage was assessed in biopsy or necropsy sections obtained within one week of the serum vitamin B<sub>12</sub> estimation, and was arbitrarily graded 0 to +++.

In the miscellaneous group, the serum vitamin B<sub>12</sub> level was high in one patient with chlorpromazine hepatitis (Case 55) and normal in two patients, one with passive venous congestion of the liver (Case 56) and one with systemic lupus erythematosus with liver involvement (Case 57).

#### Correlation of Vitamin B<sub>12</sub> Levels with Clinical and Biochemical Findings.

Table II presents correlations of vitamin B<sub>12</sub> levels with the cause of the liver disease, with the clinical condition of the patient, with the degree of jaundice as judged by the serum bilirubin level, and with the levels of serum albumin, serum gamma globulin and plasma glutamic oxalacetic transaminase.

In nutritional liver damage serum vitamin B<sub>12</sub> levels tended to be lower than in other types of diffuse liver disease; this correlates with previous observations that there is less impairment of liver function in nutritional than in other forms of hepatitis (Owen *et al*, 1953). The highest levels were found in acute hepatic necrosis and in extensive metastatic cancer of the liver, wherein stores of vitamin B<sub>12</sub> would be undepleted by liver atrophy or previous liver damage.

In 40 cases the serum vitamin B<sub>12</sub> level appeared to correlate with the clinically assessed severity of the hepatitis when this was independently assessed as being mild, moderate or severe. Similarly, there was some correlation between vitamin B<sub>12</sub> levels and the degree of liver damage as assessed by the laboratory measurement of jaundice.

Biliary obstruction *per se* was not responsible for elevated vitamin B<sub>12</sub> levels, the mean level for this group being 795  $\gamma\gamma$  per millilitre. Low albumin and high gamma globulin levels showed some association with high serum vitamin B<sub>12</sub> levels.

Since both plasma glutamic oxalacetic transaminase and vitamin B<sub>12</sub> are said to be released from damaged liver cells, it was surprising that no correlation could be estab-

TABLE II.  
Correlation of Clinical and Biochemical Changes with the Total Serum Vitamin B<sub>12</sub> Levels in Liver Disease.

Diagnostic and Biochemical Categories.	Total Number of Cases.	Total Serum Vitamin B <sub>12</sub> ( $\gamma\gamma$ per ml.). Ranges.				
		200 to 700.	700 to 1350.	1350 to 2000.	Over 2000.	Mean Level.
<b>Clinical diagnosis:</b>						
Active chronic hepatitis ..	20	3	11	4	2	1372
Nutritional hepatitis ..	14	7	5	2	0	866
Acute infectious hepatitis ..	7	2	3	1	1	1564
Obstructive jaundice ..	4	2	2	0	0	795
Metastatic cancer ..	6	0	2	1	3	2175
<b>Clinical status:</b>						
Mild (+) ..	15	8	6	1	0	762
Moderate (++) ..	18	4	8	5	1	1316
Severe (+++) ..	7	0	4	1	2	1812
<b>Jaundice:</b>						
Absent ..	16	5	8	2	1	1160
Serum bilirubin level (mg. per 100 ml.):						
1 to 2 ..	11	4	4	2	1	1335
3 to 6 ..	8	1	3	2	2	1683
Over 6 ..	10	1	3	2	4	2237
<b>Albumin level</b> (grammes per 100 ml.):						
Over 4 ..	3	0	2	1	0	1209
3 to 4 ..	8	4	4	0	0	765
2 to 3 ..	14	5	6	3	0	971
Under 2 ..	0	0	0	3	3	2080
<b>Gamma globulin level</b> (grammes per 100 ml.):						
0.8 to 1.4 ..	8	4	2	2	0	874
1.4 to 2 ..	7	2	4	1	0	1007
Over 2 ..	10	1	7	1	1	1260
<b>Plasma glutamic oxalacetic transaminase level</b> (units):						
Under 25 ..	4	0	3	1	0	1039
25 to 50 ..	12	4	2	2	4	2100
50 to 100 ..	10	1	6	2	1	1495
Over 100 ..	6	0	4	0	2	1940

\* Correlations made in active chronic, nutritional and acute infectious hepatitis groups only.

\* Estimated by a zinc sulphate turbidity technique.

lished between serum vitamin B<sub>12</sub> levels and simultaneous estimations of transaminase activity (Tables I and III). Moreover, in Case 12 a dramatic clinical improvement followed cortisone administration, and the plasma glutamic oxalacetic transaminase level fell rapidly (Case 3, O'Brien *et alii*, 1958), but the serum vitamin B<sub>12</sub> level remained unaltered.

In 19 cases liver tissue was available (from biopsy or necropsy) within one week of obtaining blood for vitamin B<sub>12</sub> estimation. The degree of cell necrosis, cell regeneration and leucocytic infiltration was independently assessed and graded from absent to ++, and compared with vitamin B<sub>12</sub> levels for each case (Table IV).

Cell regeneration and leucocytic infiltration did not correlate with vitamin B<sub>12</sub> levels. When disorganization of architecture was present, serum vitamin B<sub>12</sub> levels were lower, presumably due to liver cell atrophy and depleted vitamin B<sub>12</sub> stores (Swendsen *et alii*, 1957). There was a correlation with liver cell necrosis except for grades defined as nil and +; this may reflect an acknowledged difficulty, particularly in liver biopsy material, in grading minor degrees of liver cell damage short of actual necrosis.

#### Electrophoresis of Sera having High Vitamin B<sub>12</sub> Levels.

In normal serum, vitamin B<sub>12</sub> is mainly bound to alpha-1 and alpha-2 globulins (Pitney *et alii*, 1954; Miller, 1958). Serum was examined electrophoretically in those cases showing highly elevated vitamin B<sub>12</sub> levels (Table V). The gamma globulin level was frequently elevated in these cases, whereas alpha globulin levels were normal.

TABLE III.  
Serial Serum Vitamin B<sub>12</sub> and Plasma Glutamic Oxalacetic Transaminase Levels in Liver Disease.

Case Number.	Diagnosis.	Period of Observation (Weeks.)	Serum Vitamin B <sub>12</sub> Level ( $\gamma\gamma$ per ml.)	Plasma Glutamic Oxalacetic Transaminase (Units.)	Clinical Course.
5	A.C.H.	0	1340	—	No change. Relapse after 28 weeks; improved with cortisone treatment.
7	L.H.	36	1336	65	
		0	679	326	
10	L.H.	3	328	53	No change.
		23	1000	580	
		29	756	78	
11	A.C.H.	52	564	316	Gradual improvement without specific therapy. Improved with cortisone therapy. Initially improved with cortisone therapy. Died from bronchopneumonia. Slow deterioration.
		84	512	30	
		87	464	42	
12	A.C.H.	0	1863	45	Improved with cortisone therapy.
		12	4000	28	
		13	1180	19	
16	L.H.	0	1163	950	Improved with cortisone therapy. Died from bronchopneumonia.
		1	1248	660	
		3	1141	212	
17	L.H.	0	1682	42	Improved with dietetic treatment. Recovered.
		40	1373	15	
		63	1429	35	
18	L.H.	96	1209	35	Improved with dietetic treatment. Recovered.
		0	802	400	
		10	370	20	
25	N.H.	22	902	31	Recovery (Mackay <i>et alii</i> 1957).
		0	1328	16	
		1	1256	19	
41	L.H.	52	875	22	Recovery (Mackay <i>et alii</i> 1957).
		0	5000	168	
		4	760	—	
47	O.N.	0	7040	26	Recovery (Mackay <i>et alii</i> 1957).
		11	288	—	

\* A.C.H., active chronic hepatitis; L.H., lupoid hepatitis; N.H., nutritional hepatitis; I.H., infective hepatitis; O.N., obstructive necrosis.

#### Urinary Vitamin B<sub>12</sub> Excretion Studies.

In the acute stage of liver disease, particularly when the level of free vitamin B<sub>12</sub> is greatly elevated, the daily urinary excretion of vitamin B<sub>12</sub> may be increased to thirty times the normal value of 0.11  $\gamma$  per day (Jones *et alii*, 1957). In two cases (Cases 9 and 40) with moderately elevated total and free vitamin B<sub>12</sub> levels, the urinary output of vitamin B<sub>12</sub> (free) was raised, being 0.41  $\gamma$  per day, but was normal (0.11  $\gamma$  per day) in Case 16.

#### Biliary Excretion of Vitamin B<sub>12</sub>.

The possibility that vitamin B<sub>12</sub> is normally excreted in the bile was considered, and therefore a small dose of vitamin B<sub>12</sub> labelled with radioactive cobalt (Co<sup>60</sup>) was given intravenously to a patient with complete biliary fistula. In 24 hours, 1% of the dose had been excreted in the bile, suggesting that biliary excretion might occur, but in small amounts. Normal vitamin B<sub>12</sub> levels were found in cases of uncomplicated obstructive jaundice, further suggesting that biliary obstruction *per se* is not an important cause of raised serum vitamin B<sub>12</sub> levels.

#### Vitamin B<sub>12</sub> Absorption from Gut.

Increased absorption of vitamin B<sub>12</sub> has not been considered as a cause of elevated serum levels of vitamin B<sub>12</sub> in liver disease. However, Maslow *et alii* (1957), using the Schilling technique, found a high urinary excretion of vitamin B<sub>12</sub> by one patient with systemic lupus erythematosus and by one with Laennec's cirrhosis, and both had raised serum globulin levels. Two patients with chronic liver disease with elevated serum globulin levels were



examined by the Schilling method, and the percentage of radioactive vitamin B<sub>12</sub> excreted in the urine was within the normal range (16.4% and 7.7%).

#### Discussion.

We have confirmed the observations of Rachmilewitz *et alii* (1956, 1958) and of Jones *et alii* (1957) that the concentration in serum of vitamin B<sub>12</sub> is frequently elevated in states of hepatocellular damage, and is normal in uncomplicated biliary obstruction. We found the serum

TABLE IV.  
Correlation of Serum Total Vitamin B<sub>12</sub> Levels and Liver Biopsy Findings in Liver Disease.

Liver Biopsy Finding.	Total Number of Cases.	Total Serum Vitamin B <sub>12</sub> (γγ per ml.) Ranges.				Mean Level.
		200 to 700 (Normal)	700 to 1350.	1350 to 2000.	Over 2000.	
Cell damage: <sup>1</sup>						
0 ..	7	3	2	1	1	1550
0+ ..	6	3	2	1	1	1000
++ ..	4		1	2	1	2082
+++ ..	2				2	4214
Cell regeneration:						
0 ..	14	4	2	3	5	2167
0+ ..	3	2	1			663
++ ..	0					
+++ ..	2		2			880
Leucocytic infiltration:						
0 ..	1				1	2476
0+ ..	1			1		1388
++ ..	11	4	3		4	2145
+++ ..	6	2	2	2		1105
Disorganization of architecture:						
Not present ..	6	1	1		4	3246
Present ..	13	5	4	3	1	1124

<sup>1</sup> The degree of cellular damage, regeneration and leucocytic infiltration were arbitrarily graded from 0 (no change) to +++ (gross cell necrosis and damage).

concentrations of both the protein-bound and the free forms of vitamin B<sub>12</sub> to be elevated in hepatitis, and in two cases slightly increased urinary excretion of free vitamin B<sub>12</sub> was demonstrated. Higher levels of total and free vitamin B<sub>12</sub> were found in those conditions wherein normal rather than cirrhotic liver tissue was being subject to acute damage; this may be a reflection of the decreased liver cell mass with diminished hepatic stores of vitamin B<sub>12</sub>, which is found in chronic hepatitis and cirrhosis. Our finding of high levels in metastatic cancer of the liver corresponds with that of others (Grossowicz *et alii*, 1957; Mendelsohn and Watkins, 1958).

Clinical and experimental evidence favours release of stored vitamin B<sub>12</sub> from damaged liver cells as an explanation for high serum levels. Thus the raised serum levels of vitamin B<sub>12</sub> in acute hepatocellular damage may fall to normal, coincident with recovery of the liver (Mackay *et alii*, 1957); similar findings have been obtained in experimental carbon tetrachloride poisoning of rats (Yamamoto *et alii*, 1957). However, certain of our data were not in accord with this simple release hypothesis. We observed raised levels of vitamin B<sub>12</sub> in the absence of clinical evidence of severe liver damage, and raised levels in active chronic hepatitis sometimes remained steadily at a high level despite fluctuations in the clinical course of the disease. Moreover, serum vitamin B<sub>12</sub> levels often failed to correlate well with the degree of cell damage as judged by the liver biopsy and by the levels of plasma glutamic oxalacetic transaminase, which are considered to be a sensitive index of liver cell necrosis (Molander *et alii*, 1957). In one patient with severe hepatitis (Case 12) the serum vitamin B<sub>12</sub> level remained elevated after a striking clinical remission with a fall in plasma glutamic oxalacetic transaminase levels had been induced with cortisone.

In liver disease, a raised maximal binding capacity of the serum for vitamin B<sub>12</sub> has been demonstrated (Rachmilewitz *et alii*, 1956; Baker *et alii*, 1958), and this may account, partly at least, for the elevated vitamin B<sub>12</sub> levels in certain of our cases. We were unable to demonstrate raised levels of the alpha globulins, which are known to bind vitamin B<sub>12</sub> (Pitney *et alii*, 1954; Miller, 1958); possibly the gamma globulin, which was considerably increased in many cases, functioned as a vitamin B<sub>12</sub> binding protein, as suggested by Jasinski *et alii* (1958).

Other mechanisms which may account for raised serum vitamin B<sub>12</sub> levels were considered, including increased absorption from the gut (Maslow *et alii*, 1957) and

TABLE V.  
Paper Electrophoretic Analyses of Sera with Elevated Vitamin B<sub>12</sub> Levels.

Case Number.	Diagnosis. <sup>1</sup>	Total Vitamin B <sub>12</sub> Level (γγ per ml.)	Levels of Globulin Fractions. (Grammes per 100 ml.) <sup>2</sup>			
			Alpha-1.	Alpha-2.	Beta.	Gamma.
5	A.C.H.	1340	0.2	0.2	0.6	1.8
11	A.C.H.	4000	0.2	0.2	0.4	2.6
12	A.C.H.	1200	0.2	0.2	0.8	2.8
7	A.C.H.	1000	0.2	0.2	0.8	5.4
17	A.C.H.	1682	0.2	0.2	0.6	3.8
25	N.H.	375	0.2	0.3	0.5	1.1
46	O.H.N.	3500	0.3	0.5	0.6	2.0
47	O.H.N.	7040	0.2	0.7	0.7	2.3

<sup>1</sup> A.C.H., active chronic hepatitis; N.H., nutritional hepatitis; O.H.N., obstructive hepatic necrosis.

<sup>2</sup> Slightly higher values for gamma globulin were obtained by paper electrophoretic analysis than by the zinc turbidity method.

obstruction to the biliary tract, but these were shown not to play a significant role.

#### Conclusions.

The raised serum vitamin B<sub>12</sub> levels which occur in diffuse parenchymal disease and secondary carcinomatosis of the liver have at least two explanations: (i) simple release in acute hepatic necrosis; (ii) a raised maximal vitamin B<sub>12</sub> binding capacity of the serum, as may occur in more prolonged liver disease.

These studies indicate that there is a significant disturbance of vitamin B<sub>12</sub> metabolism in liver disease. From the practical viewpoint, the serum vitamin B<sub>12</sub> level is not a particularly sensitive index of the activity of liver disease, for it may be normal in patients with known chronic hepatitis, and raised levels may persist in phases of remission. Moreover, since microbiological assay of vitamin B<sub>12</sub> is slow and time consuming, this procedure is not considered likely to prove of value in the clinical assessment of the nature and severity of liver disease.

#### Summary.

1. The serum level of vitamin B<sub>12</sub> has been estimated in 57 cases of liver disease by the technique of microbiological assay; raised levels were demonstrated in neoplastic and diffuse parenchymatous liver disease.

2. Levels were highest in acute necrosis and in metastatic cancer of the liver. The raised levels in active chronic hepatitis and nutritional hepatitis usually, but not always, paralleled the activity of the disease as assessed by biochemical and biopsy criteria.

3. Both release of stored vitamin B<sub>12</sub> from necrosed liver cells and an increase in the vitamin B<sub>12</sub> binding capacity of the serum may account for elevated serum vitamin B<sub>12</sub> levels. Biliary obstruction and increased vitamin B<sub>12</sub> absorption from the gut were considered unimportant factors.

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### ANÆSTHETIC EMERGENCIES.

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THE most important single fact about anæsthetic emergencies is that the vast bulk of them are easily preventable. It is in their prevention that most can be done, because, as with all accidents, the best treatment by the greatest experts in the world may not restore the happy state that existed before. The precautions for the prevention of anæsthetic emergencies are simple and widely known, but unfortunately they are not always strictly applied.

There is a tendency to relate the magnitude of the anæsthetic to the magnitude of the operation; the anæsthetic for removal of a toenail or a single tooth comes to be regarded as a fooling procedure to be undertaken with no significant equipment at hand. The risks to the patient under these conditions are likely to be greater than if he was undergoing a partial gastrectomy.

The problem is to foresee hazards and plan counter-measures and is therefore largely one of education. One of the main objects of anæsthetic training is to ingrain safe habits that are not forgotten in times of stress, and it is for this reason that the ideal training includes much supervised practical work over a long period.

The minimal safe requirements for any anæsthetic are as follows: (i) An efficient sucker—if not actually working, able to be made so immediately. (ii) A face mask and bag connected to a source of oxygen, so that oxygen can be offered to the patient or forced upon him by manual compression of the bag as required. Artificial respiration with a bag and face mask—and a pharyngeal airway if needed—is extremely simple to perform, and should be commonly practised by all who give anæsthetics. An experienced person can accurately assess the state of the patient's airway by the feel of the bag. An inexperienced person will probably inflate the stomach like a football, and it is therefore better to become familiar with the procedure by practising under safe conditions. (iii) A syringe and vasoconstrictor drugs for intravenous injection.

These three—a sucker, oxygen and a syringe—are the bare essentials for first-aid treatment of anæsthetic emergencies.

It is perhaps not so widely realized that the same basic equipment should be available when a local anæsthetic agent is used. The emergencies which can arise are essentially similar—respiratory or cardio-vascular collapse or vomiting. In addition, if a significant volume of local anæsthetic is to be injected, "Pentothal" should be available in case of overdosage or inadvertent intravenous injection.

Whatever equipment the anæsthetist has assembled, he must always test it before use and be completely aware of its condition. This checking of equipment should become quite a routine procedure; it must always include a check on the amount of gas present in any cylinders to be used, and also confirmation of the fact that a bag full of oxygen can be obtained on demand and delivered under manual positive pressure. The introduction of non-interchangeable cylinders and connexions has virtually disposed of the unwitting administration of the wrong gas, but we are already using a large and increasing variety of very potent drugs by injection—all, with the exception of "Pentothal", are colourless solutions.

The intraarterial or subcutaneous injection of "Pentothal" is a well-recognized hazard. It is the alertness of the anæsthetist that is of paramount importance here, for it is not arterial puncture which is harmful but the injection of a substantial quantity of solution. Here I would strongly advise the routine use of "Pentothal" in 2.5% solution. I have yet to hear of serious consequences following intra-arterial or subcutaneous administration of a solution of this strength.



"Pentothal" injected subcutaneously is best dispersed with a large volume of normal saline with hyalase added, the area then being treated with moist heat to ensure local vasodilatation.

If an intraarterial injection produces observable vascular changes in the limb, the operation should be postponed, because subsequent treatment may involve full doses of heparin to prevent thrombosis in the damaged artery. Treatment is aimed at overcoming the severe spasm of the artery and its collaterals. Local anaesthetic should be injected through the needle if it is still in the artery. Brachial plexus block should be performed at once and repeated later if necessary. Tolazoline, 50 mg. in a 1% solution injected into the subclavian artery, will induce arterial dilatation in the whole limb. If any evidence of arterial spasm remains, the patient should be given full doses of heparin.

Respiratory obstruction, if complete, is an emergency in its own right; if it is partial, and is allowed to persist, it carries the risk of much graver developments later. The maintenance of a perfect airway is a simple mechanical problem which must be within the scope of anyone who gives anaesthetics. Snoring noises reveal fairly gross obstruction; a sense of vibration on light palpation over the larynx reveals a lesser degree of obstruction. Neither of these conditions should be tolerated. Supporting the patient's chin, with a pharyngeal airway in place if necessary, will almost invariably yield a perfect airway. Only very rarely is an endotracheal tube needed purely to overcome respiratory obstruction.

Laryngeal spasm and bronchial spasm are far easier to prevent than cure. An adequate dose of atropine given at the right time—at least one hour before operation subcutaneously, at least 20 minutes before operation intravenously—is the most important single preventive measure.

For known asthmatics and others with irritable bronchi, such as heavy smokers and bronchitics, bronchodilator drugs should be used as premedication in preference to the bronchoconstricting morphine group. Pethidine and "Phenergan" are among the very powerful bronchodilators.

Avoid laryngeal irritants. An airway should be selected intelligently for its size and shape, and well lubricated with "Xylocaine" jelly. If ether is used, it must be introduced to the larynx with a carefully graded increase of concentration, drastically reduced for a time if any degree of spasm appears.

Vomiting or regurgitation of fluid from the stomach of a relaxed patient is an anaesthetic emergency of the first order, for inhalation of vomitus rates high in the causes of anaesthetic deaths; it is, for instance, now the greatest single cause of maternal death in obstetrics. Accident patients and women in labour may have food retained in their stomachs for many hours. There are two reasonably safe ways of handling these patients, as follows:

1. Put the patient on his side, and use an inhalation method in which the protective reflexes are still active at the stage when vomiting is likely. It is a simple matter, once the patient has passed this stage, to pass a large-bore stomach tube and suck out the liquid component of the stomach content before placing him in position for operation. A carefully maintained anaesthetic should then prevent him from vomiting until the operation is over and he is once more on his side.

2. Pass a large-bore endotracheal tube with a cuff into the oesophagus beyond the cricopharyngeus with the aid of a local anaesthetic. With the cuff inflated, this will provide good protection during an intravenous induction of anaesthesia until the trachea can be intubated. It also acts as a good guide for the stomach tube after induction of anaesthesia.

Should vomiting occur during an anaesthetic, immediate treatment is essential. The institution of pharyngeal suction and head-down tilting of the patient, irrespective of surgical considerations, are necessary at once. If there is any suspicion of inhalation, bronchial suction should be performed and repeated at the end of the operation.

Diabetics are frequently still exposed to this danger by virtue of the glucose which is forced upon them by mouth before operation. There is no longer any justification for this, for in diabetics we have one group in which this risk can be entirely eliminated. If a patient is so severely diabetic as to need glucose before operation, it should be given intravenously.

Cases of intestinal obstruction differ only in being worse. Here the stomach content is liquid—the stomach is probably distended with it, and the supply is almost unlimited. A stomach tube must be passed before the anaesthetic is started, the stomach emptied as well as it can be and the tube left open to drain. The insertion of a cuffed endotracheal tube is the only means of obtaining real protection in these cases.

Acute adrenocortical insufficiency is an emergency which has recently come into prominence and seems likely to become more common in the future. This failure to withstand operative and anaesthetic stress is prone to appear in all types of adrenal failure, and the commonest one now is suppression secondary to cortisone or corticotrophin therapy. The risk of any surgical procedure on patients suffering from Addison's disease was stated to be prohibitive as long ago as 1931. A recent review of reported cases of anaesthesia in Addison's disease showed that out of 18 patients with no special preparation, 90% developed severe hypotension during or after the anaesthetic and the mortality rate was 56%. In comparison, in a series of 20 patients prepared with specific hormone therapy, hypotension occurred in 50% and there was no mortality.

This inability to respond adequately may appear very early in cortisone therapy, and after cortisone treatment has been discontinued the pituitary adrenal axis may take several months—some authorities say up to two years—to recover normal function.

In adrenocortical insufficiency, patients react to the stress of anaesthesia and surgery by hypotension (out of all proportion to the blood loss), respiratory depression and delayed recovery. Different degrees of this response are seen, depending on the severity of the condition and the stress. Severe hypotension from this cause has been reported to follow minor procedures, such as manipulation of a shoulder joint or uterine curettage.

Catastrophes from drug-induced adrenocortical failure are entirely preventable. Patients receiving cortisone or one of its analogues should be given special "cover", commencing the day before operation and tapering off over the first three or four days after operation. Dosage should be generous—of the order of 100 mg. three times on the day of operation and on the day after, the amount being reduced to the previous level over the next three days. The same routine should apply to those who have discontinued cortisone therapy within the past six months. Recent work has shown that in therapeutic doses cortisone does not interfere with wound healing.

Patients who, unknown to the anaesthetist, are having or have had cortisone will continue to present a problem. The possibility of this condition should be considered in all cases in which severe hypotension fails to respond to adequate blood replacement and the administration of vasopressor drugs. If it is due to adrenocortical failure, the condition responds dramatically to an intravenous drip administration of hydrocortisone (100 mg. in 500 ml. of solution).

Cardiac arrest is the most startling of all anaesthetic emergencies. Its incidence is increasing because of the greater willingness to operate on poor-risk patients. The published incidence varies widely, from one in 800 to one in 5000 anaesthetics. It is evident that the anaesthetic agents *per se* are not the cause, as it has been recorded with almost every type of anaesthetic. However, there are certain anaesthetic agents in ordinary use which increase the irritability of the heart and frequently produce extrasystoles, and these must never be used when adrenaline is injected by the surgeon. Cyclopropane, chloroform, "Trilene" and, according to some authorities, the recently introduced "Fluothane" belong to this group.



The outstanding predisposing cause is chronic anoxia. Sometimes this is due to an impaired myocardial blood supply and is beyond our correction. All too often it is produced by the anaesthetist who is prepared to tolerate an imperfect airway. It is, for instance, not sufficiently realized that a patient breathing under an "open ether" mask is always hypoxic unless a trickle of oxygen is added under the mask. He is receiving an inspired oxygen concentration of about 14%. The presence of an endotracheal tube does not guarantee an airway. Kinks, ballooning cuffs, incorrect positioning and partial mucous obstruction are more common than they should be.

Other predisposing causes are (i) overdose of anaesthetics, (ii) massive haemorrhage with resultant hypotension and hypoxia and (iii) vasovagal reflex—though this is not likely to be a contributing factor if the subject has received adequate atropine.

There are two types of cardiac arrest—cardiac asystole and ventricular fibrillation; differentiation of the two types is possible only by an electrocardiographic tracing or by looking at the heart.

The diagnosis of cardiac arrest can be difficult, and it must be made quickly. The brain can withstand anoxemia for only four minutes without permanent damage. Figures published in a series of cases of cardiac arrests in Los Angeles show that of those patients whose cardiac rhythm was restored within four minutes of recognition of the condition, 42% recovered completely; after four minutes, only 7% recovered, and these all showed permanent cerebral damage.

The anaesthetist will notice absence of pulse in any of the normal areas, cessation of respiration and dilatation of the pupils. He should ask the surgeon to feel for aortic pulsation if the operation is abdominal, and should himself auscultate the heart if there is a stethoscope immediately at hand. The final court of appeal in diagnosis can also be the first step in treatment, in the form of a fourth left intercostal space incision. If the incision reveals any arterial blood, time can be spared for the more usual methods of resuscitation.

Cardiac arrest being established, there are two urgent essentials, cardiac massage and rhythmic inflation of the lungs with oxygen. Most authorities state that the anaesthetist should pass an endotracheal tube if one is not already in place; obviously this will lead to more secure ventilation, and should therefore be done if the anaesthetist is familiar with the procedure and has a tube at hand. The urgent need, however, is for oxygen in the lungs, not for a tube in the trachea, and it will be wiser in many cases to settle for the early second-rate ventilation of a bag and facemask than to lose time in the struggle for the perfection of an endotracheal tube. Manual compression of the heart will achieve a systolic pressure of 60 to 80 mm. of mercury, which is adequate if the blood is oxygenated to maintain cerebral tissue indefinitely.

If the heart is in a state of ventricular fibrillation, it should be electrically defibrillated if a defibrillator is available. Otherwise an intracardiac injection of 5 ml. of a 1% procaine solution or 200 mg. of procaine amide should be given.

If the heart is in asystole, 0.5 ml. of adrenaline or 2 to 5 ml. of 10% calcium chloride solution should be given. Massage should continue as long as the heart continues to refill.

If the heart commences beating, again the minimal surgical procedure should be completed and then the chest closed, with the anaesthetist maintaining the lungs fully expanded. An endotracheal tube is essential at this stage, otherwise the pressures involved in reexpanding any collapsed portion of lung will distend the stomach with gas.

Post-operative treatment must include the following: (i) oxygen administration for at least 24 hours; (ii) scrupulous attention to the airway—if the patient is comatose, this will involve the insertion of an endotracheal tube or a tracheostomy, with tracheal aspiration as required;

(iii) maintenance of blood pressure—vasopressor drugs and the intravenous drip administration of a nor-adrenaline solution if necessary; (iv) antibiotics; (v) the insertion of a Ryle's or similar tube, because acute dilatation of the stomach is extremely common.

There have been a number of reports indicating that these people recover more quickly and more completely if they are subjected at once to vigorous dehydration therapy. The reason for this is that brain tissue, damaged to a reversible extent, may still be lost by the onset of cerebral oedema. This oedema is produced very quickly as a result of increased capillary permeability due to hypoxic damage to the cerebral vessels themselves.

Sucrose (50% solution) is probably the dehydrating agent of choice, because it does not pass into the cerebrospinal fluid, and it produces vigorous diuresis, which avoids interstitial rebound oedema; this can be dangerous if glucose or saline is used. The recommended dose for an adult is a first dose of 40 ml. given intravenously to assess its effect; there should be at least some lightening of the coma. This is repeated in 15 minutes and again in 30 minutes if required. Thereafter dehydration is continued with the drip administration of 10% "Dextran" solution at a rate of about 50 ml. per hour.

Despite our preoccupation with emergencies during the anaesthetic, analysis of large numbers of anaesthetic accidents has shown that the period of greatest risk to the patient is between the end of the operation and the return of full consciousness. Vomiting, respiratory and circulatory depression and laryngeal and bronchial spasm are the common complications of this period.

Recovery rooms staffed by adequately trained and equipped people are the best answer here, the next best is an anaesthetic technique which allows rapid return of consciousness with supervision of this period by the anaesthetist. After some near fatalities when the patients were on their way back to bed, the Director of Anaesthesia at the Royal Adelaide Hospital has introduced an inflexible rule for his registrars that no patient leaves their care until he is conscious enough to respond to spoken orders.

The most common failings of anaesthesia are still the old and well-known ones—vomiting and obstruction of airway especially in the immediate post-operative period, failure to check drugs and apparatus, a relative overdose of "Pentothal", and too slow a recognition and treatment of hypoxia and circulatory collapse.

## Reports of Cases.

### INFECTIOUS MONONUCLEOSIS WITH THROMBOCYTOPENIC PURPURA IN A CHILD.

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INFECTIOUS MONONUCLEOSIS has several uncommon complications, such as hepatitis, aseptic meningitis, pericarditis, peripheral neuritis, haemolytic anaemia and thrombocytopenic purpura.

Thrombocytopenic purpura is a rare complication, occurring in approximately 0.7% of 300 consecutive cases reviewed by Pader and Grossman in 1956. Bleeding, however, as a manifestation of infectious mononucleosis is not quite so uncommon. Tidy, in 1921, reported the occurrence of haematuria in 6% of 270 cases of infectious mononucleosis, and in 1945 Read and Helwig, in a review of the bleeding manifestations of the disease, reported epistaxis in 2% and haemoptysis in 1% of 300 cases.

#### Clinical Record.

On July 3, 1958, a boy, aged seven years, was admitted to the Brisbane Children's Hospital suffering from a petechial rash. He had been well until the evening prior

to admission, when he complained of a sore throat. One five-grain aspirin tablet was given. On the morning of his admission to hospital blood blisters were noticed on the lips, but the child went cheerfully to school. On his return home that afternoon, his parents noticed bruises on his legs and spots over the remainder of his body. His previous health had always been good, and neither the patient nor his family had ever shown any bleeding tendencies. He had taken aspirin in the past without ill effect, and there was no past history of allergy or exposure to toxic substances. Past illnesses included chicken-pox and measles at the age of five years.

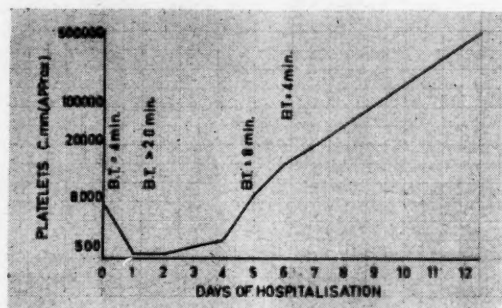


FIGURE I.

Graph demonstrating the fall and rise in the level of platelets in the blood.

Examination of the patient revealed him to be a cheerful, well-nourished lad showing no pallor or icterus. His temperature on admission was 99° F., but thereafter it was normal. There was a generalized petechial rash affecting chiefly the legs, the buttocks, the mucosa of the palate and the buccal mucosa. Moderately sized ecchy-

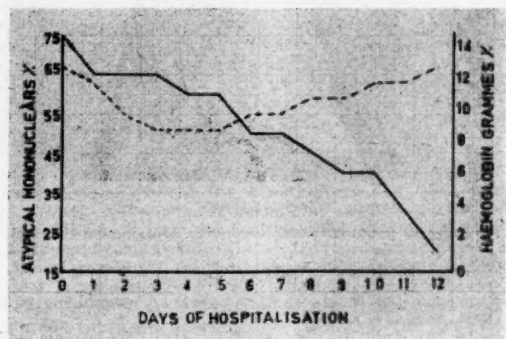


FIGURE II.

Graph showing the fall of atypical mononuclear (continuous line) and the fall and rise of haemoglobin (dotted line).

moses were scattered over the knees, ankles and pretibial regions. The tonsils were haemorrhagic and oozing blood. There was no membrane. The result of Hess's test for capillary fragility was negative. Firm, discrete, non-tender lymph nodes averaging 0.5 to 1.0 cm. in diameter were palpable in the cervical, axillary, inguinal and supratorchlear regions. The splenic tip was easily palpable 3 cm. below the left costal margin, and the liver edge 1 cm. below the right costal margin. Neither was tender. The blood pressure was 80/60 mm. of mercury. The optic fundi were normal. Physical examination revealed no other abnormal features.

A blood examination on the patient's admission to hospital showed no anaemia. There were large numbers of

atypical mononuclear elements, peroxidase-negative and showing typical features of infectious mononucleosis cells. The diagnosis was confirmed by a strongly positive Paul-Bunnell reaction (Davidsohn). An indirect platelet count revealed marked thrombocytopenia. The bleeding time (Duke) and clotting time (capillary tube) were normal. A marrow biopsy showed a normal pattern of erythropoiesis and granulopoiesis and normal cellularity. Of the lymphoid cells present, 20% were atypical and appeared identical with the type seen in infectious mononucleosis. Megakaryocytes were slightly increased in all stages of maturation. The most mature showed azurophilic cytoplasm, but none was observed to be shedding platelets. The day after his admission to hospital the number of platelets fell to one per 100 oil fields, the result of Hess's test became positive and the bleeding time was greater than 20 minutes.



FIGURE III.

Photograph demonstrating petechiae on lips, face, neck and left ear. A cervical gland is visible on the left side of the neck.

On the third day, because the oozing from the tonsils was heavier and the petechial rash more extensive, and the haemoglobin value had fallen to 10.8 grammes per 100 ml. (Haldane), it was decided to begin therapy with ACTH 20 international units each of crystalline and gel preparations given by intramuscular injection. Two days later there was clinical improvement, as witnessed by fading petechiae. The platelet count had risen to approximately 1500 per cubic millimetre and the bleeding time had fallen to eight minutes.

Steady clinical and haematological improvement continued until the child was discharged from hospital with a normal platelet count, 13 days after his admission.

Other investigations carried out were as follows: X-ray examination of the chest revealed no abnormality. The serum bilirubin content was 0.2 mg. per 100 ml. On July 3, microscopic examination of the urine revealed

eight red blood cells per high-power field; four days later, an occasional red blood cell per high-power field was seen.

The Wassermann reaction was negative. The absolute eosinophil count was 90 per cubic millimetre. The erythrocyte sedimentation rate was 0 to 10 mm. per hour (Cutler).

When he was examined one month later, the boy was perfectly well. The liver and spleen were impalpable, the lymph nodes were reduced in size. The hæmoglobin and platelet counts were normal. The white cells numbered 9000 per cubic millimetre, 5% being atypical mononuclear cells. The response to the Paul-Bunnell test was negative.

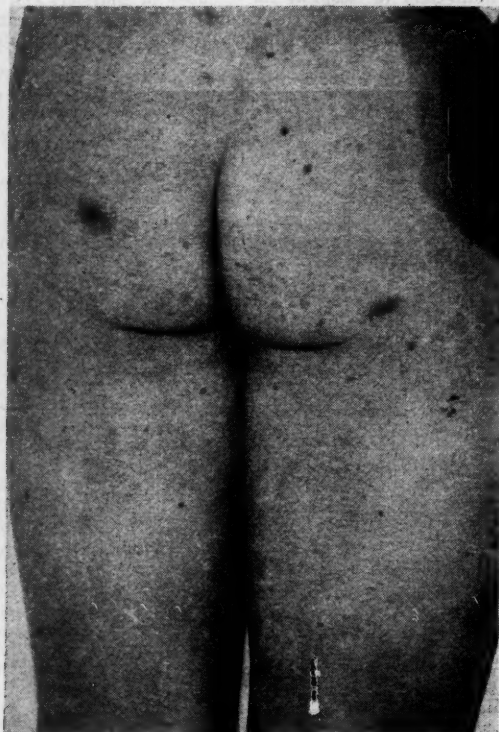


FIGURE IV:

Photograph demonstrating petechiae over buttocks and posterior aspects of thighs. The stain unfortunately is caused by iodine.

#### Discussion.

In view of the lymphadenopathy, the hepatosplenomegaly, atypical mononuclear leucocytes in blood and marrow, the strongly positive reaction to the Paul-Bunnell test on three occasions and a rapid and apparently complete clinical recovery, there seems little doubt about the diagnosis of infectious mononucleosis. This, therefore, is adequate to explain the thrombocytopenic purpura.

Because of the natural tendency of this rare complication of infectious mononucleosis to be self-limited, it is impossible to evaluate the effect the ACTH had on the course of the disease, although the immediate rise in the number of platelets following its administration is very suggestive of a direct action.

#### Summary.

The occurrence of thrombocytopenic purpura in a case of infectious mononucleosis confirmed by heterophil antibody reaction and bone marrow biopsy is reported. Treatment with ACTH appeared to be of benefit.

#### Acknowledgements.

I wish to thank Dr. Felix Arden, under whose care the patient was admitted to hospital, for his helpful criticism and encouragement in the preparation of this report, and Dr. H. A. Copeman for giving the benefit of his experience gained with a similar case. I also thank Mr. L. R. Robinson of the Hæmatology Department, and Dr. D. C. Flson for permission to use the Brisbane Children's Hospital records.



FIGURE V.

Photograph demonstrating extensive bruising of the legs.

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#### PRIMARY CARCINOMA OF THE URETER.

By A. B. HOLMES,  
Launceston, Tasmania.

THOUGH not now considered rare, well over 300 cases having been reported in the literature, primary neoplasm of the ureter all too often escapes pre-operative diagnosis. The following case is the only case of primary carcinoma of the ureter encountered in a busy urological clinic in the last ten years. Senger and Furey (1951) quote an incidence



of 1:1300 in 1951, as against 1:7000 in 1939, perhaps suggesting an increased awareness of the condition and a more diligent search for these tumours. The average delay between the initial symptoms and diagnosis has been twenty months, with a generally poor prognosis.

The following case exemplifies the difficulties and dangers in diagnosing these tumours even at operation.

#### Clinical Record.

The patient, a woman, aged 73 years, was first seen in April, 1956. For three months prior to being seen she had noticed the daily passage of small amounts of blood at the commencement of micturition. There had been no pain, and she was otherwise in good health.

Physical examination showed no abnormality apart from the presence of a small urethral caruncle.

Cystoscopic examination in June revealed no abnormality, and the urethral caruncle was excised. After this there was no further hæmaturia.

In August routine retrograde pyelographic examination, which was performed in view of the past history of hæmaturia, showed a complete block 2 cm. up the right ureter. No opaque calculi were present.

In September intravenous pyelographic examination showed no function on the right side.

In October repeat retrograde pyelographic examination confirmed the block 2 cm. up the right ureter. This time a profuse hæmorrhage from the right ureteric orifice followed the instrumentation, though this ceased over the next few hours. A ureteric tumour, primary or secondary, was thought to be the cause.

On October 26, right nephroureterectomy was performed; the kidney, ureter and uretero-vesical junction were removed *en bloc*. The lower end of the right ureter was exposed through a midline suprapubic incision. The ureter was grossly distended, and bluish in colour above a hard nodule in the ureter 1 cm. from the bladder. At first it was thought that this could be a non-opaque calculus, but the history of recurrent hæmaturia and the absence of pain made a tumour more likely. Consequently, the uretero-vesical junction with a cuff of adjacent bladder was excised, and after precautions were taken to prevent spilling, the ureter was split up, exposing a tumour and confirming the diagnosis. After this region was covered with a fingerstall, the operation was completed through a twelfth-rib incision.

The pathological report on the specimen was as follows: "Naked Eye: Received for examination the total kidney with ureter attached, weighing 110 grammes. A small kidney (9½ × 5 × 4 cm.) on section showing the appearance of hydronephrosis with dilated calyces and pelvis. The portion of ureter (30 cm. long) is greatly dilated; the distal portion is obstructed by well defined tumour measuring 3 cm. in length; section shows firm whitish tumour with lobulated appearance which is invading the wall; the distal 2 cm. of ureter appears free of tumour."

Histological examination revealed a well-differentiated papillary and solid transitional cell carcinoma of the ureter, which was invading the muscle layer; the line of excision was well clear of the tumour. Sections of the renal parenchyma showed the typical appearances of hydronephrosis; the stroma was diffusely infiltrated with chronic inflammatory cells.

#### Comment.

There was a long delay of seven months between the initial symptoms and the final diagnosis. The commonest presenting symptoms are hæmaturia (70%), flank pain (30%), or a mass (20%). Hæmaturia was the sole symptom or sign in this case, despite the progression of the lesion to cause complete obstruction of the ureter, with hydronephrosis, hydroureter and a non-functioning kidney.

Baron and Green (1954) recognize two syndromes as being very suggestive of a primary ureteral tumour.

(1) Hydronephrosis, usually associated with hæmaturia, but not necessarily associated with hydroureter. Ureteric catheterization may fail to demonstrate a block.

(2) A functionless kidney, usually with a history of hæmaturia and with some obstruction demonstrable in the ureter.

This case fits in exactly with the second, and commoner, syndrome.

Harrison, Warres and Fust (1949) collected ten cases of primary ureteral tumours and emphasized the cessation of hæmaturia with non-specific therapy and subsequent delay in adequate urological investigation. In the case presented here the bleeding ceased after excision of a urethral caruncle, which was most misleading.

This latent interval, whether due to complete blockage of the ureter or to some other cause, is reassuring to the patient and to his or her adviser. However, the urinary tract must be fully investigated without delay in every case of hæmaturia, even if some possible cause is found before completion of the investigations, if the survival rate for this insidious condition is to improve. An intravenous pyelogram will often fail to demonstrate ureteric pathological conditions and early filling defects may be shown only by ureterograms, as shown by Tressider, who employed a Braasch bulb catheter. Immediate cystoscopic examination of every patient with hæmaturia would save much delay in establishing a diagnosis at a later date.

The operative findings, where the hardness of the localized nodule was at first confused with that of a stone, were in this respect similar to those in a case reported by MacLean (1954). In this latter case also the ureter had to be incised at operation before the diagnosis could be confirmed. A non-opaque ureteric stone should always be suspect.

#### Summary.

A further case of primary carcinoma of the ureter is described.

The reasons for the common long delay between the initial symptoms and definitive treatment are briefly discussed.

#### Acknowledgement.

I should like to thank Mr. W. H. Graham, Preston, for his comments and assistance.

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#### SOLITARY DIVERTICULITIS OF THE CAECUM.

By THOMAS F. ROSE,

Surgeon, The Royal North Shore Hospital of Sydney.

INFLAMMATION in a bowel diverticulum usually follows an existing cause, such as obstruction to its lumen. In the case to be described, an inflamed solitary caecal diverticulum was found to have its narrow neck blocked by a faecolith. However, there were no symptoms attributed to this lesion until immediately after the patient suffered a blow on the abdomen. Thus it was apparent that this blow was at the least an aggravating if not the exciting cause of the subsequent inflammatory process of the diverticulum.

## Clinical Record.

The patient, a male aged 21 years, had been well prior to this illness, except for recurrent attacks of staphylococcal furunculosis.

Two days prior to admission to hospital he was stretching up to do some electrical work above his head when he was punched accidentally on the right lower quadrant of his abdomen by a workmate. This made him double up with immediate, severe, generalized abdominal pain. This pain lasted only a few minutes, and was replaced by an ache for the next three hours. The patient then commenced to suffer further severe continuous generalized abdominal pain, which gradually increased in intensity over the next 24 hours, when he passed two loose stools without relief of the pain.

When seen at hospital, 48 hours after his injury, the patient was a very sick-looking young man. His temperature was 102° F., his pulse rate was 110 per minute and his tongue was furred. There was a tender movable mass present in the right lower abdominal quadrant about two inches in diameter.

Some three hours after his admission to hospital the abdomen was explored. There was found on the anterior wall of the caecum a large solitary diverticulum just above and to the right of the ileo-caecal junction. The diverticulum was acutely inflamed and its lumen was full of pus distal to a hard faecolith, which was blocking its small opening into the caecum. Surrounding the base of the diverticulum, in the caecal wall, was a large abscess full of foul-smelling pus, which was on the point of perforation into the general peritoneal cavity.

The appendix was normal.

The affected area, including the diverticulum and abscess, was excised *en masse*, and the resultant hole in the caecal wall sutured.

Convalescence was complicated by ileus for four days and was then uneventful.

Microscopic examination of the diverticulum showed that it was acutely inflamed. Large numbers of polymorphonuclear cells were present. The mucosa of the diverticulum was intact.

Culture of the pus from the abscess revealed *Bacillus proteus*, which was sensitive to chloromycetin and streptomycin.

## Discussion.

Solitary diverticulum of the caecum is rare. The incidence of all diverticula of the colon is said to lie between 5% and 8% (Ransom, 1954), but only 2% of these occur as solitary diverticula of the caecum (Case and Shea, 1953). This inflammation of such a solitary diverticulum is even more rare, though Mann (1958) saw three cases in one year.

The interesting point in this case lies in the aetiology of the inflammatory process and its relationship to the blow on the abdomen. There was present an inflamed diverticulum, the narrow neck of which was found at operation to be blocked by a faecolith. The inflammation had spread into the caecal wall surrounding the base of the diverticulum to form an abscess. No symptoms occurred until the abdomen was struck on the region overlying the caecum and its diverticulum. Symptoms then immediately followed receipt of the blow, so that it is obvious that the blow must have aggravated the preexisting condition of a narrow-necked diverticulum with a faecolith in its lumen, but not entirely occluding it. The blow injured the caecum, causing at least some traumatic swelling and edema of the caecal wall round the diverticular neck. This helped the faecolith to occlude the lumen completely, so causing the inflammatory process to proceed apace.

The relationship of the blow to the lesion was important to the patient, as it occurred when he was engaged in his normal work. Consequently he was granted compensation under the *Workers' Compensation Act*.

## Acknowledgement.

I wish to thank Dr. John Dykes of Turramurra for his help in the care of this patient.

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## Reviews.

**Medical Education: Annotated Bibliography, 1946-1955.** World Health Organization; 1958. Geneva: World Health Organization. 9½" x 6", pp. 392. Price: £115s., \$6.75, Sw.Fr. 20.

THIS is a remarkably comprehensive guide to the literature on medical education. It contains some 2600 annotated references from the medical literature between 1946 and 1955; these were selected from 4000 references which were carefully examined. The references have been classified alphabetically by author under the following headings: History of medical education; aims, trends and general considerations; special subjects; pre-medical education for students; teachers; curriculum; the patient in medical education; academic teaching; audiovisual aids; research in medical education; medical skill in the community; internship and licensure; countries and continents. An author index makes for further ease of reference. With the extensive reexamination of medical education that is going on today, and especially with the determined efforts to deal with it on a world-wide basis, this publication must be of great value.

**Enzymes in Blood.** By L. P. White *et alii*: "Annals of the New York Academy of Sciences", Volume 75, Art. 1; 1958. New York: The New York Academy of Sciences. 9" x 6", pp. 384, with many illustrations. Price: \$5.00.

THIS series of papers is the result of a conference on enzymes in blood held by the New York Academy of Sciences in February, 1958. The conference was planned with the specific goal of increasing the contact between the clinical investigators of blood enzymes and members of other groups, such as enzymologists and physical chemists, so that the skills of each, the problems of each and the deficiencies of each might at one point in time be viewed by all, and that, through such an appraisal each might gain in understanding and so increased ability for his own investigations. There are 42 papers in all, grouped under five main headings, dealing with enzymes in white blood cells, enzymes in red blood cells, enzymes in blood coagulation and in platelets, serum enzymes and their origin and the clinical significance of blood enzymes.

**Principles of Ethics.** By Dom Thomas Verner Moore, M.D., Ph.D., completely revised by Dom Gregory Stevens, S.T.D.; Fifth edition; 1959. Philadelphia and Montreal: J. B. Lippincott Company. Sydney: Angus & Robertson Limited. 8" x 5", pp. 296. Price: 66s.

THE original author of this book, Dom Thomas V. Moore, M.D., Ph.D., was formerly head of the Department of Psychology and Psychiatry in the Catholic University of America. The present edition has been completely revised by Dom Gregory Stevens of the Department of Religious Education in the same university, and Professor of Moral Theology in St. Amsel's Priory. The purpose of the book is stated to be to acquaint the student with the basic principles of ethics in such a way as to make its study of direct practical value. Special attention is given to fundamental philosophical questions in the early chapters, on the reasonable grounds that "the moral agent must have a sound knowledge and ready command of the basic principles on which to base any particular ethical decision". The basis of the book is the teaching of St. Thomas Aquinas, who, as the book states, brought together in a new synthesis of moral thought in the Middle Ages the Judaeo-Christian tradition and the scientific method and the doctrine of Aristotle. No attempt has been made in the book to discuss other schools of ethical thought as this is regarded as being beyond the scope of the volume.



Although the book deals with ethical principles in a general way, it has specific medical applications. Particular reference is made to the problems of the nursing profession and to questions of nursing ethics, but many medical men will find the discussion of interest. The book is in two parts. Part I deals with general ethical principles and is divided into chapters on the nature of ethics, human acts, good and evil in human action, the emotions, concerning virtue in general, law and obligation, and prudence and conscience. Part II is concerned with the virtues and the moral life; it has chapters on the action of prudence, the nature of justice, justice and individuals, justice and the right to life, justice and speech, truthfulness and secrecy, property rights, social virtues, friendship, civil law and the nurse, fundamental principles of religion, the virtue of fortitude, courage and action, the virtue of temperance, the morality of sexual life, principles of the married life, and further applications of temperance. Although this book, by its deliberate self-limitation to the views of one school of thought, will not be acceptable in detail to those of other schools of thought, it is a thoughtful presentation and warrants the consideration of all who are concerned with problems of ethics, especially medical ethics.

**Modern Treatment Yearbook, 1959: A Yearbook of Diagnosis and Treatment for the General Practitioner.** Edited by Sir Cecil Wakeley, Bt., K.B.E., C.B., LL.D., M.Ch., D.S.C., F.R.C.S., F.R.S.E., F.R.S.A., F.A.C.S., F.R.A.C.S.; Twenty-fifth edition, 1959. London: Baillière, Tindall & Cox, Limited. 8½" x 5½", pp. 330, with illustrations. Price: 30s. (English).

ALTHOUGH this is the Silver Jubilee volume of this well-known year book it follows the normal pattern of its recent predecessors. It contains 31 articles ranging over practically the whole field of medicine. Each article is by a physician or surgeon of standing and is essentially clinical and practical in its purport. The volume should be just as acceptable as its successful predecessors.

**Genetic Concept for the Origin of Cancer.** By Leonell C. Strong *et alii*; "Annals of the New York Academy of Sciences", Volume 71, Art. 6; 1958. New York: The New York Academy of Sciences. 9" x 6", pp. 434, with many illustrations. Price: \$5.00.

A CONFERENCE on the "Genetic Concept of the Origin of Cancer" was held in October, 1957, under the joint support of the New York Academy of Sciences and the National Advisory Cancer Council, National Institutes of Health, Public Health Service, Bethesda. As a result 28 papers on the subject have been brought together in this single volume. In an introduction it is pointed out that three purposes are embodied in the monograph: first, to review the historical development of the genetic concept of the origin of cancer, second, to introduce new observations in the genetics of cancer, and third, to give an opportunity to other scientists using different techniques to report their findings in order to ascertain whether these discoveries are complementary or antagonistic to a genetic concept. The role of genetics in the study of cancer is stated to be twofold: (i) to investigate the possibility of a host or constitutional influence on cancer stability and cancer resistance and (ii) to visualize the intrinsic or cellular changes in contrast to the extrinsic or environmental influences involved in the origin of the cancer cell from a somatic cell. This volume will bring together for the information of those working in the field of cancer research a variety of otherwise scattered material on an important concept.

**Aids to Neurology.** By E. A. Blake Pritchard, M.A., M.D., F.R.C.P.; Second edition; 1959. London: Baillière, Tindall and Cox. 6½" x 4", pp. 488, with illustrations. Price: 15s. (English).

**Aids to Medical Treatment.** By T. H. Crozier, B.Sc., M.D., D.P.H., F.R.C.P.; Fourth edition; 1959. London: Baillière, Tindall and Cox. 6½" x 4", pp. 376. Price: 15s. (English).

THESE two books belong to the well-known Students' Aids series, which is designed to provide the student with the essentials of each subject in as short a compass as possible.

The author of "Aids to Neurology" is the Physician-in-Charge of the Department of Neurology at the University College Hospital, London, and Physician to the National Hospital for Nervous Diseases, Maida Vale. He has aimed to present his material primarily in clinical form. The more common nervous disorders are dealt with, firstly

by describing their clinical pictures, then by describing their cause and treatment, and lastly by explaining their symptomatology in terms of alterations in the physiological activity of known anatomical mechanisms. The first sections of the book deal with the peripheral nervous system, diseases of the spinal cord, diseases of the brain and the autonomic (vegetative) nervous system; then a separate section of the book is devoted to the general question of anatomy, physiology and symptomatology as applied to the central nervous system, diseases of the brain and the special senses. Appendix I deals with the clinical examination of nervous activities and Appendix II with the electroencephalogram.

"Aids to Medical Treatment" aims to offer a "concise and up to date summary of medical therapeutics" and certainly squeezes a large amount of information within its small bulk. The author is Physician to the Royal Victoria Belfast City Hospitals.

Both these books should be acceptable to those who are looking for expositions of potted but reliable medicine.

**Third Tissue Homotransplantation Conference.** By John Marquis Converse, Blair O. Rogers *et alii*; "Annals of the New York Academy of Sciences", Volume 73, Art. 3; 1958. New York: The New York Academy of Sciences. 9" x 6", pp. 330, with many illustrations. Price: \$5.00.

THE Third Tissue Homotransplantation Conference was held in February, 1958, at the New York Academy of Sciences. The 37 papers presented at the Conference are published in this volume. They are grouped in four parts, which deal with the following broad subjects: embryonal, fetal, neonatal and infant tissue transplantation; immunogenetics of tissue transplantation; antibodies and antigens in tissue transplantation; graft-versus-host reaction and acquired tolerance in tissue homotransplantation. In a brief introduction it is pointed out that the papers demonstrate the rapid advances made in the new biological and clinical speciality of tissue homotransplantation. Special importance is attached to the papers dealing with specific desensitization of the delayed hypertensive state and evidence of a passive transfer of serum antibody against skin homografts, with further clarification of the role of lymphatics and draining lymph nodes in homotransplantation phenomena, with work now in progress on the identification of various antigenic components of transplanted cells, and with the increasing attention being paid to the behaviour of embryonal, fetal and neonatal tissue transplants. The next conference on the subject is to take place in 1960.

**Personality Change and Development as Measured by the Projective Techniques.** By Molly Harrower, Ph.D.; 1958. New York and London: Grune & Stratton, Incorporated. 10" x 6½", pp. 390, with illustrations. Price: \$10.00.

THIS book deals with change in performance at psychological tests in some 60 persons referred by physicians. The author set out to discover whether the results of psychological projection tests would reflect the changes in behaviour and subjective experience which follow psychological treatment or other comparable forms of intervention, and also whether, from the same test material, there could be seen any individual patterns of normal growth due to the passage of time. The data were collected over 10 to 15 years.

Patients who improved after long-term psychotherapy showed moderate gains at the tests. Patients who improved after short-term psychotherapy showed less improvement at the tests. Patients who deteriorated showed a marked fall in their test scores. However, the author believes that, in all cases, changes in actual behaviour were much more marked than changes in test scores. The changes are hardly surprising, but their documentation is of some importance.

The book is beautifully produced, but verbosely written and highly priced.

**The Year Book of Obstetrics and Gynecology (1958-1959 Year Book Series).** Edited by J. P. Greenhill, B.S., M.D., F.A.C.S., F.I.C.S. (Honorary); 1958. Chicago: The Year Book Publishers. Melbourne: W. Ramsay (Surgical), Limited. 7½" x 5", pp. 608, with 49 illustrations. Price: £4 2s. 6d.

THE 1958-1959 "Year Book" follows the same plan as previous volumes on this subject, and is again edited by J. P. Greenhill. The obstetrical half of the book is divided into: (i) a section on pregnancy, with subsections



on physiology, abortion, ectopic pregnancy, complications, and the toxæmias; (ii) a section on labour, with subsections on general aspects, analgesia and anaesthesia, complications, operative obstetrics and uterine hæmorrhage; (iii) and (iv) short sections on the puerperium and the newborn. Among topics receiving considerable attention the following may be mentioned: five abstracts and a substantial editorial comment on the surgical treatment of the incompetent cervix in cases of habitual abortion; six abstracts discussing post-maturity; three abstracts on therapeutic abortion from the United States, Norway and Sweden. The last are accompanied by a full editorial discussion of legal abortions and sterilization, in which reference is made to the position in various countries.

The gynecological half of the book includes sections on general principles, diagnosis, infertility, operative gynecology, infections, non-malignant neoplasms, malignant tumours, menstrual disorders and endocrinology. As was to be expected, the cytological diagnosis of uterine cancer and carcinoma-in-situ receives considerable attention, both in the section on diagnosis and in that on malignant disease. It appears that in many American centres hysterectomy is regarded as the correct treatment for carcinoma-in-situ except in special circumstances, though some authors advocate a less radical attitude. Only three papers on colposcopy are noted, one from Cairo and two from Jefferson Medical College; the editor comments that everyone who writes about colposcopy is enthusiastic, yet the colposcope is not very much used in the United States.

**The Basic and Clinical Research of the New Antibiotic, Kanamycin.** By Maxwell Finland, R. B. Aronson et alii; "Annals of the New York Academy of Sciences", Volume 76, Art. 2; 1958. New York: The New York Academy of Sciences. 9" x 6", pp. 390, with many illustrations. Price: \$5.00.

THE 38 papers in the volume are the result of a conference on the "Basic and Clinical Research of the New Antibiotic, Kanamycin" held in July, 1958. Kanamycin is an antibiotic discovered by Hamao Umezawa and his co-workers at the National Institute of Health, Tokyo. Chemically it is closely related in its structure to neomycin and has some features in common with streptomycin, but it is clearly distinct from both. *In vitro* it has been shown to be highly or moderately active against many common pathogenic aerobic Gram-positive and Gram-negative bacteria and mycobacteria, but some pneumococci, most streptococci and *Pseudomonas* were found to be moderately or highly resistant, and anaerobic organisms, yeast or fungi were nearly all highly resistant. Of immediate interest is its activity against pathogenic staphylococci, irrespective of their resistance to other antibiotics in common use, but resistance to kanamycin can be readily induced in staphylococci and in *Escherichia coli*. Clinically the drug has been found to be effective in staphylococcal and gonococcal and anthrax infections, as well as in many acute and chronic infections of the urinary tract, but chronic infections with *Pseudomonas*, enterococci and some *Proteus* strains appear to be resistant. Failures have been reported in infections with such strains and with pneumococcal and streptococcal infections. Given orally kanamycin inhibits aerobic intestinal bacteria and is useful in pre-operative preparation of the large bowel. The effect on tuberculosis has not been striking and resistance is rapidly acquired. The major toxic effects are on the kidney and eighth cranial nerve, but these can probably be minimized to a certain extent by caution in its use.

**Current Medical Research.** 1958. London: Her Majesty's Stationery Office. 9½" x 6", pp. 54, with many illustrations. Price: 3s. (English).

THIS thin pamphlet, issued each year by the Medical Research Council as part of their annual report, is a document of great interest, as it contains a selection of articles reviewing progress in some of the subjects in which research is being carried on under the auspices of the Council. They are in fact interim reports on current research. Most of them are quite brief, but the importance of their subject matter is not to be measured by the number of their paragraphs. The first of the 14 articles in the present pamphlet concerns the achievement of J. C. Kendrew in constructing the first model of a protein molecule ever to be made, and gives something of the background necessary to appreciate the nature of this feat and the techniques by which it was accomplished. In contrast to this very basic research achievement, the second article discusses the development of respirators from the invention of the "iron lung" by Philip Drinker in 1929; much of this development has been the result of

projects undertaken at the instigation of the Council, and the whole story is an excellent example of the way in which the Council can function to initiate converging lines of research to a specific end. Three brief articles refer to investigations on influenza and other virus research. An article on experimental leukaemia describes researches which have yielded substantial advances in our understanding of this disease. Other papers deal with such varied subjects as the mechanism of fever, the quantitative estimation of female sex hormones and experimental studies on radiostrontium. It should be noted that though this collection of articles is a part of the Medical Research Council's report for 1956-1957, they do in fact embody the information available up to May, 1958.

## Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Autogenic Training: A Psychophysiological Approach in Psychotherapy", by Johannes H. Schultz, M.D., and Wolfgang Luthe, M.D.; 1959. New York and London: Grune & Stratton, Inc. 9" x 5½", pp. 304, with 26 illustrations. Price: \$9.50.

A book on what is described as "one of the most widely applied psychotherapeutic methods in central Europe".

"Instrumentation in Anesthesiology", by William H. L. Dornette, M.D., and Verne L. Brechner, M.D.; 1959. Philadelphia: Lea & Febiger. Sydney: Angus & Robertson, Limited. 9½" x 5½", with 130 illustrations. Price: 88s.

The authors aim to explain the principles of operation, application and interpretation of representative examples of monitoring devices used by anaesthetists.

"The Treatment of Diabetes Mellitus", by Elliott P. Joslin, A.M., M.D., Sc.D., Howard F. Root, M.D., H.H.D., Priscilla White, M.D., Sc.D., and Alexander Marble, A.M., M.D., et alii; Tenth Edition; 1959. Philadelphia: Lea & Febiger. Sydney: Angus and Robertson, Limited. 9" x 6", pp. 798, with 153 tables. Price: £9 1s. 6d.

The previous edition appeared in 1952.

"The Meaning of Poison", by Lloyd G. Stevenson, M.D.; 1959. Lawrence: University of Kansas Press. 8½" x 5½", pp. 64. Price: \$2.00.

The seventh series in the Logan Clendening Lectures on the History and Philosophy of Medicine.

"Squint and Allied Conditions", by George P. Guilbor, M.D., D.D.S.; 1959. New York and London: Grune & Stratton, Inc. 9" x 5½", pp. 368, with 99 illustrations. Price: \$11.50.

Personal observations based on the study of 41,500 patients seen in clinics and in practice over 25 years.

"Progress in Psychotherapy", Volume 4 "Social Psychotherapy", edited by Jules H. Masserman, M.D., and J. L. Moreno, M.D.; 1959. New York and London: Grune & Stratton, Inc. 9" x 5½", pp. 384, with illustrations. Price: \$8.75.

Deals with fundamentals of psychotherapy, methods of social psychotherapy, special techniques and developments abroad.

"Parsons' Diseases of the Eye", by Sir Stewart Duke-Elder, G.C.V.O., Ph.D., D.Sc., LL.D., M.D., F.R.C.S., F.R.A.C.S., F.A.C.S.; Thirteenth Edition; 1959. London: J. & A. Churchill Ltd. 8" x 5½", pp. 621, with illustrations. Price: 50s.

A considerably revised edition prepared since the death of the original author.

"The Essentials of Roentgen Interpretation", by L. W. Paul, M.D., and J. H. Juhl, M.D.; 1959. New York: Paul B. Hoeber Inc. 10½" x 7½", pp. 556, with 1203 illustrations. Price: \$25.00.

A text-book of X-ray diagnosis.

"A Primer of Water, Electrolyte and Acid-Base Syndromes", by E. Goldberger, M.D., F.A.C.P.; 1959. Philadelphia: Lea and Febiger. Sydney: Angus and Robertson Ltd. 7½" x 5", pp. 322, with illustrations. Price: 66s.

The approach is clinical.

## The Medical Journal of Australia

SATURDAY, OCTOBER 17, 1959.

### THE SCHOOL MEDICAL SERVICE OF VICTORIA.

THE School Medical Service of Victoria is this year celebrating its jubilee. This is to be marked by a special publication referring to the work and history of the Service, and also by an exhibition of its activities, during Health Week in October. It is of interest to note that the English School Medical Service celebrated its jubilee during 1958, so that the Victorian service is almost as old. The story began when, as a result of the efforts of "leading educationists and doctors", the appointment of medical officers to the Education Department was sanctioned in 1909. The staff of three consisted of Dr. (now Emeritus Professor) Harvey Sutton, Dr. Mary Booth and Dr. Jane S. Greig. The stated purpose of their appointment was to examine all school children, starting with those in the urban areas; a complete medical examination, not merely an inspection, was the objective. Education was now compulsory, and public opinion was beginning to demand that, if the children were thus brought to the schools, they should be in the optimal condition to receive and assimilate the information provided. An attempt was to be made to influence health and development and environment, so that every child should have full opportunity to develop the best in him, and thus become a more efficient citizen. The importance of this is clear from the fact that a preliminary survey by the medical officers had shown the existence of a vast amount of hitherto unrecognized physical defect and disease amongst the children in schools. The first annual report signed by the three medical officers concluded with the statement: "To bring the primary education of our State in line with modern requirements, universal and systematic courses of hygiene should be instituted, the present attention to new buildings extended to the older ones, and a scheme for the medical examination of the children of the State, particularly in the younger classes, put into practical working, assistant medical officers being appointed for that purpose." It was also urged that provision should be made by the State for the treatment of certain classes of defect and disease such as dental disease.

Results were soon evident. In the annual report of 1911-1912 an account is given of return visits to schools previously examined, each school having been visited every two years. The medical officers were impressed with the improvement shown in children whose parents had "taken the trouble" to act on the advice given to them, especially regarding tonsils and post-nasal growths. At the same

time the opportunity was taken to demonstrate to teachers the difference between treated and untreated children. A further development was that the examination of high school pupils had opened up the question of certification of candidates for the teaching service. Any definite defect of teeth, vision, hearing, etc. had to be remedied before the candidate was accepted as a junior teacher.

In July, 1915, the staff of medical officers was increased to four. The scope of examination was extended to take in the special schools—the open-air school for underprivileged children, and those for the mentally abnormal, the deaf and dumb, the blind and the epileptic. In the report it was stated that many defects were found here, and the comment was made: "Surely one defect is of itself so serious that children should be spared any further handicap, and should have all curable defects treated." In the report of 1915 also, mention was made of the fact that many temperamentally unsuitable types were entering the teaching service, and that these were liable to break down later, and to require extensive sick leave. As might be expected, owing to the general increase of nervous disorders in the community, this remains a problem in the recruitment of suitable teachers at the present time. The mental health of the teacher in training is very important, having regard to his necessary adjustments to the college community and to the strain imposed by his studies. Later again, the health of the children in his charge is liable to be harmed if the teacher is emotionally immature.

The year 1944-1945 is notable in that the School Medical Service ceased to be attached to the Education Department, and came under the control of the Department of Health. All activities relating to child health were organized by a new department of Maternal and Child Hygiene under the general direction of the Chief Health Officer. Since then the School Medical Service has steadily grown in scope and importance, and at the present time the staff consists of 36 doctors and 41 school nurses. In dealing with school children the main purpose of the service is set down as being to "maintain the physical, social and emotional health of the school population at the highest level so that all children can derive the maximum benefit from education, and ultimately be able to leave school mentally and physically fit, and ready to play their full part in the community". It is necessary to detect defects of all kinds, accurately to assess them and their probable effects, and to arrange for their appropriate treatment—and if necessary for special educational facilities. A "follow-up" system will help parents to implement the advice given. Special surveys may be necessary from time to time.

The School Medical Service in Victoria is ever alert to promote health education in the community. Health education is regarded as representing a vital part of one of the most important activities of the Ministry of Health—to influence the public towards the adoption of healthier living patterns. In the field of health education the position of the school teacher is almost unique. The teacher because of his vocation can exert profound effects

on the habits and attitudes of his pupils and, indirectly, through them may influence the attitudes of their parents. Thus, one of the most important channels through which public health policy can be rendered effective throughout the State is through the teachers' colleges. With this in mind the whole of the health education work of the School Medical Service is at present under consideration having regard to its great importance and the desirability of its expansion. As part of the plan representatives of the Service at present give lectures on health to teachers in their training colleges. It has also to be borne in mind that, as has been amply shown, the pattern of disability in the community has changed to one in which communicable diseases are being replaced by those in which there is a personal failure of adaptation. In the first-mentioned group favourable results were achieved by legislative and administrative action; but in the second group only personal enlightenment and motivation are likely to produce results. This is the task of health education. At the same time, during the work of the School Medical Service special consideration is given to children with handicaps. A handicapped child is described as one suffering from any mental or physical defect which does not permit of normal activity or achievement. Detection of children so affected represents one of the most important activities of the Service. By this means a great deal of individual suffering can be saved, and families can be given relief from what otherwise would be a continuing burden. From the economic point of view also the ultimate cost to the State of one person whose handicap was neglected in childhood can amount to a very large sum.

At the turn of the century teachers and administrators were free of many of the problems which challenge them today. The purpose of the elementary school was to teach children certain fundamental skills and that body of factual knowledge laid down in official courses of study and contained in officially approxed texts. The task was to give lessons, test their assimilation, reward successful effort and "good behaviour", and impose punishments for failure and misbehaviour. Modern concepts of education and recognition of individual differences have changed all this and brought with them a host of problems never imagined in less complicated days. If a child is failing in his school work he is not now necessarily regarded as blameworthy, but he presents a problem to be solved. The reason for his backwardness must be sought and a remedy found if possible. Education to serve his special needs must then be provided. The School Medical Service in Victoria cooperates to the fullest extent with the Education Department in the recognition and handling of all such children as this. At the same time the medical examination of teachers is an important aspect of the work of the service. Their suitability for employment has to be assessed, in the light of the nature of their work and their influence on the children. Eligibility for superannuation has to be carefully considered, as also has the fitness of teachers to resume work after illness. Thus it may well be said of the School Medical Service in Victoria (as it equally well may be said of sister services in other States)

that it is a first class example of preventive medicine in action. Its cost is more than offset by the increased productiveness of those who are set on the road to better and lasting health, and it plays a vital rôle in ensuring the effectiveness of our rightly prized system of universal education.

## Current Comment.

### MACROMOLECULES AND CARCINOGENESIS.

THIS is the day of plastics, and high polymers of carbon and silicon are being used in almost every field of human endeavour. However, observations made over the past few years have indicated that some of these macromolecules can be dangerous to man if they are introduced into the tissues. Numerous experiments have shown that various synthetic and semisynthetic water-insoluble carbon and silicon polymers elicit sarcomas in rats and mice at the site of their implantation. Some water-soluble polymers act in the same way, but the malignant growths are widespread through the body. Water-soluble and water-insoluble polymers are being used to an increasing extent in the human environment, in numerous forms of consumer goods, medical and cosmetic preparations, medical prostheses, containers for all kinds of things, household goods, paints, textiles and many others. Do these things present any danger of carcinogenesis in man, and how do they act on the tissues? W. C. Hueper<sup>1</sup> has investigated the carcinogenic effects of ten different polyvinylpyrrolidones (PVP), eleven different dextrans, all water-soluble, and several water-insoluble carbon and silicon polymers in rats, mice and rabbits. A very large number of experiments were performed. Whenever the cancer rate in a test series was found to be two or three times that of the control series, and especially when such a ratio followed the introduction of a particular polymer by several routes and into several species, the macromolecule was considered to possess carcinogenic properties. Under the experimental conditions observed, some, but not all, PVPs, some but not all dextrans, a polyvinyl alcohol and a silicon polymer were found to be carcinogenic to mice, rats and probably rabbits.

There are fundamental differences between polymers with apparently the same chemical structure but made by different methods. While it is not yet possible to say why different polymers differ in their action, or indeed why they are carcinogenic at all, some evidence is given that average molecular weight and ratio of branch to linear member groups in a polymer are not the important factors. It is the configuration of the chain as a whole and the chemical properties rather than physical properties that matter. The carcinogenic effect of water-soluble polymers involves several organs, mainly those in which the macromolecular substances are retained and stored over long periods—that is, organs rich in reticulo-endothelial tissues. The carcinogenic effect of water-insoluble polymers is limited to the site of implantation, i.e. mainly the subcutaneous connective tissue. Some authorities believe that polymer carcinogenesis, with insoluble polymers, is a non-specific, physical phenomenon essentially analogous to the sarcomas obtained around disks of certain implanted metals. Hueper considers that his results make this belief untenable.

There is at present no valid evidence that the use of PVP polymers in such things as dentures and contact lenses is related to cancer in the exposed tissues, but, as Hueper states, it would be wise to make carefully controlled surveys on the cancer incidence in persons thus exposed to determine the harmlessness or otherwise of such exposures. Similar consideration should be given to the use of ion-exchange resins, administered by mouth, for increasing the faecal excretion of sodium in cardiac oedema or as an antacid in dyspepsia. The use of macro-

<sup>1</sup> A.M.A. Arch. Path., 1959, 67: 589 (June).



molecular chemicals in cosmetic and medicinal products, such as ointments, creams and laxatives, merits careful attention. Workers employed in the production, processing and handling of polymers or plastics should be under medical supervision. The risk of carcinogenesis is not great, but it does exist.

#### WHERE ARE THE CASES OF RADIUM POISONING?

Few subjects have been as intensively discussed in the last few years as the dangers of radioactive fallout, but in nearly all this discussion it is assumed that the incorporation of increased quantities of radioactive materials into the human body is an entirely new phenomenon. It is not widely realized that, especially in North America, there are alive today a not inconsiderable number of people who, deliberately or accidentally, took appreciable quantities of radioactive materials into their systems thirty or more years ago. In a recent plea for assistance, S. D. Clark, of the Radioactivity Center of the Massachusetts Institute of Technology, asks for help in tracing such individuals.<sup>1</sup> At the Radioactivity Center a central catalogue has been set up for recording all cases of chronic irradiation poisoning in human beings, by certain internally deposited "alpha emitters". It is intended in this way to establish an information centre where all such data will be available, in one location, for the future study and correlation of such items as the amount of internally deposited radioactivity and its effect on the incidence of bone changes and tumours, in shortening the life span, and in increasing susceptibility to various diseases.

In the preamble to this request Clark states that there is a large number of persons alive today who in the 1920's acquired internal deposits of radium, mesothorium, radiothorium, thorium-X, thorium dioxide, or various combinations of these. Some were luminous dial painters. It is now well known that the methods of painting luminous dials employed at that time were highly dangerous, and that many dial painters died from the early or late effects of radium poisoning; but Clark states that it is reasonably certain that about 2000 luminous dial painters from the early 1920's are still living, most of them in good health. Others drank radioactive waters, or received injections of radium chloride. This was apparently an accepted form of therapy in the United States (and possibly elsewhere) between 1915 and 1930, and must be one of the most egregious examples of the blind use of an empirical therapy, inspired largely, it would seem in retrospect, by the thought that it was new and "scientific" and therefore must be good.

Whatever the cause of their radioactivity, such persons form a potentially valuable pool of clinical material, if they can be traced, in which to study the long-term biological response of man to continuous low doses of radiation. Clark points out the importance of such studies in relation to the currently controversial topic of strontium 90, stating that by examining human beings with 30 years' exposure to minute amounts of radiation, rather than laboratory animals with a few months' exposure, we can get a much clearer picture of what to expect 30 years from now. However, if this harvest is to be gathered, it is important that the survivors should be traced now, before they die from natural causes. In an interesting aside Clark gives examples of how old records which would have been invaluable in this search were destroyed by accident or design. Highly relevant files of the U.S. Department of Labor were destroyed as a matter of routine after a lapse of 15 years. Other crucial data were lost in a flood. In an effort to retrieve as much as possible, Clark appeals to any doctor "who has knowledge or clue as to the whereabouts of any person, living or dead, who falls in the following categories [to] notify the Radioactivity Center, Massachusetts Institute of Technology, Cambridge 39, Mass., immediately". The categories are: (i) persons who ingested radium compounds of any sort, whether therapeutically or in the course of their occupation; (ii) persons who received parenteral injections of radium compounds for such conditions as arthritis, hypertension and gout; (iii) persons who suffered exposure in the course of radium research or the manufacture of radium products. The centre is not concerned with those who were exposed to X rays, or to the application of radium in such forms as radon seeds.

#### THE COLLAGEN DISEASES UNDER SCRUTINY.

The concept of diseases which depended on fibrinoid necrosis of the ground substance of connective tissue took the medical world by storm. Within a few years many doctors were talking of (avowedly humoral) collagen diseases without reflecting on the deeper implications of the change. At the Ninth (Toronto) Congress of the International League against Rheumatism, D. H. Collins<sup>1</sup> pointed out that the principles of cellular pathology had stood the test of 100 years; life resided in the cells, and only they respired and died. Collins said that the connective tissue as Virchow conceived it was a symbiotic whole of cells and matrix, which did not form apart from living cells.

Fibrinoid as originally described was characterized as a deeply eosinophilic substance. But I. Gersh<sup>2</sup> and other speakers at the Second Conference on Connective Tissues pointed out some inconsistencies; thus the structural criteria for the recognition of fibrinoid differ from the chemical criteria. H. B. Benusan<sup>3</sup> has complained recently of the dearth of sound information; he says that monuments of theory have been built on a shaky foundation. Benusan believes that confusion has inevitably followed the introduction of improper standards of nomenclature. H. Z. Movat<sup>4</sup> has also criticized the concept of fibrinoid. It is not, he says, formed by alteration of the cellular elements, but derives from the plasma proteins; fibrinogen is the only plasma protein which is common to all the lesions in the various diseases. Movat believes that the primary lesion is thrombotic and entails the conversion of fibrinogen to fibrin. In this he gains support from J. de Brux<sup>5</sup> of Paris, and L. Businco<sup>6</sup> of Rome. De Brux holds that fibrinoid does not arise from the metamorphosis of the ground substance, but is an insoluble derivative of fibrinogen locally produced. This phenomenon, he says, is extremely common in pathology. Chemical substances are produced which cause the blood plasma to coagulate, sometimes inside the lumen of the capillaries, sometimes just outside. When this occurs in the walls of the small vessels, it causes thickening, which has been described as hypertrophy of the media. De Brux believes that the process is essentially simple and does not require the invention of new concepts. Businco, in an equally critical article, points out that collagen is simply the name of one protein, and it is erroneous to consider the terms "collagen" and "fundamental substance" as analogous. If an alteration of collagen is considered to be the chief lesion, such lesions are common to many diseases which otherwise bear no relation to each other. Businco also criticizes those who write of "degeneration" or "necrosis" for a process which is essentially linked to varying degrees of polymerization of mucopolysaccharides. He complains that those who support the theory of fibrinoid necrosis have "left the position of the cells in the shadow". Emphasis on the preeminent position of the cells, he says, "is not just of simple theoretical value. The excessive importance given to other elements . . . often also with the help of misused terminology, has side-tracked the study of these diseases from its rightful path".

<sup>1</sup> *Ann. rheum. Dis.*, 1957, 10: 290 (September).

<sup>2</sup> *Transactions of the Second Conference on Connective Tissues*, 1952, New York, Macy Foundation: 11.

<sup>3</sup> *J. Geront.*, 1958, 13: 13 (Supplement 2).

<sup>4</sup> *Am. J. med. Sci.*, 1958, 236: 373 (August).

<sup>5</sup> *Presse méd.*, 1958, 66: 289 (February 19).

<sup>6</sup> *Int. Arch. Allergy*, 1959, 14: 205.

<sup>1</sup> *J. Amer. med. Ass.*, 1958, 168: 761 (October 11).

## Abstracts from Medical Literature.

### SURGERY.

#### Effect of Chlorpromazine on Renal Function in Shock.

E. D. SAVLOV (*Surgery*, February, 1959) has investigated the mechanism of diuresis following chlorpromazine in haemorrhagic hypotension in the dog. He found no effect of chlorpromazine on tubular reabsorption of water. He states that administration of small doses of chlorpromazine to dogs bled to blood pressures below 60 mm. of mercury resulted in increased renal blood flow. This increased vascularization of the kidney in shock after chlorpromazine was confirmed in rats. While glomerular perfusion was increased to some degree, the circulation in the medullary portion of the kidney was improved more significantly. As a result of this study, he considers that alleviation of renal ischemia in situations of profound vasoconstriction may be achieved by the use of small doses of chlorpromazine.

#### Subphrenic Abscess.

J. E. STRODE (*Surgery*, December, 1958) points out that subphrenic abscess, whilst occurring less frequently than before the antibiotic era, is still a surgical complication to be reckoned with. He states that since subphrenic abscess usually occurs in individuals debilitated from the original illness, the morbidity and mortality continue to be of serious consequence. Early recognition may be difficult because antibiotics tend to mask symptoms and signs previously relied upon in diagnosing this complication. The author states that when a patient, after upper abdominal surgery, has fever associated with leucocytosis and tenderness along the subcostal margin, a subphrenic abscess must be considered until proof to the contrary is obtained. This complication may even be present without suggestive findings. The finding of dullness at the base of the lungs with rales, bronchial breathing or absent breath sounds is much more indicative of trouble below the diaphragm than it is of a primary lesion in the thorax. If, along with these findings, X-ray study reveals a high fixed diaphragm, it may be assumed that a subphrenic abscess requiring surgical intervention is present.

#### Diaphragmatic Deficiency in the Retrocostophoid Area.

O. C. CRAIGHEAD AND L. H. STRUG (*Surgery*, December, 1958) survey the reports of 81 patients upon whom operation had been performed for diaphragmatic hernia. They found that five had defects in the retrocostophoid portion of the diaphragm. This hernia occurred through the foramen of Morgagni or its immediate neighbourhood and projected usually into the right side of the thorax. The authors point out that these hernias may or may not be associated with clinical disturbances, which may be digestive, or respiratory, or both. The colon and omentum are frequent occupants of the sac. X-ray examination reveals an

opaque, translucent or mixed shadow, according to the viscus present in the hernia, in the right anterior cardio-phrenic angle of the chest. The radiographic differentiation is helped by barium studies of the gastro-intestinal tract. Pneumoperitoneum may yield further diagnostic information. The authors state that repair of the hernia can be accomplished with equal facility either through the chest or through the abdomen. The abdominal edges of the defect are sutured to the posterior surface of the xiphisternum and costal arch.

#### Abnormal Presentation of Gastro-Jejunal Ulcer.

J. FOSTER AND R. I. CARLSON (*Surgery*, December, 1958) discuss three cases of gastro-jejunal ulcer penetrating the anterior abdominal wall. In all three cases a palpable left upper abdominal mass was present. The authors consider that a patient presenting with a left upper abdominal mass and a past history of gastric surgery for duodenal ulcer may well have a gastro-jejunal ulcer penetrating the anterior abdominal wall. If such an ulcer exists, the original operation must have consisted of an antecolic gastro-jejunal anastomosis, performed either as a gastro-enterostomy or in the course of a partial gastrectomy. The treatment of these conditions consisted of drainage of the abscess and then the appropriate treatment of the marginal ulcer; this included a gastrectomy, if that had not been done previously, together with a vagotomy.

#### Palpation for Common Duct Stones.

R. B. BROWN AND D. P. OSBORNE (*A.M.A. Arch. Surg.*, February, 1959) undertook an investigation to demonstrate the degree of accuracy with which stones can be palpated in the extrahepatic biliary ducts. The clinical material consisted of 400 unselected and consecutive cases of biliary tract surgery. In each case the second portion of the duodenum was mobilized by division of its lateral peritoneal reflection in order that the retroduodenal portion of the common duct and the ampulla of Vater might be included in a careful palpation of the entire extrahepatic biliary system. The common duct was opened and explored when the commonly accepted indications were present. The findings with respect to contained stones were then compared with those recorded on palpation prior to opening the duct. In each case in which the common duct was opened palpation of the ducts was repeated after intra-uminal manipulation had been concluded. A T-tube was then inserted and post-operative cholangiography was performed for a final check on the accuracy of palpation for detecting retained stones. Indications for opening the common duct were present in 83 cases of the 400 included in the study. In 28 of these, stones were found and removed. These were palpated prior to opening the duct in all but one case, giving an accuracy of 96.4%. In many instances it was possible to predict the exact number and dimensions of the stones which were found. Nodules in the head of the pancreas were mistaken for stones and accepted as an indication for choledochotomy in two of

the cases in which explorations gave a negative result. Post-operative cholangiograms revealed retained stones in two of the ducts explored, findings which were confirmed by reoperation for their removal. In only one of the 317 cases in which choledochotomy was not performed have subsequent events pointed to an undetected common duct stone, and this was easily palpable prior to opening the duct at the second operation. The authors give these results as evidence that meticulous palpation of the extrahepatic system is an extremely valuable and accurate method for demonstrating stones, both as an indication for choledochotomy and to minimize the incidence of retained stones.

#### Haemorrhagic Diathesis Associated with Massive Transfusion.

S. GOLLUB *et alii* (*Surgery*, February, 1959) state that an unexplained bleeding tendency in the surgical patient is not new in clinical experience, but that in the past decade, with the increasing frequency of large-scale operations with the concomitant use of large volumes of blood for replacement, fatal hemorrhage of obscure origin has raised challenging questions. This has become known as the syndrome of "hemorrhage due to massive transfusion", and the authors undertook their investigation to decide whether this serious indictment of large volume blood transfusion in such cases was justifiable. The authors report the results of the study of 38 patients who received large volumes of blood replacement. Of 37 patients who were subjected to open cardiac surgery, eight bled abnormally. Eight patients who underwent closed cardiac surgical procedures and bled abnormally were also considered. The authors conclude that thrombocytopenia was a finding common to bleeders and non-bleeders alike and was not sufficient to produce hemorrhage. A fibrinogen drop and a fibrinolysin titre were common to both groups and were not impressive. A common cause for bleeding was not evident for all cases. The defects exhibited by the bleeders embraced all phases of the blood coagulation mechanism. Massive transfusion was not sufficient to produce the hemorrhagic manifestations observed. Massive transfusions were probably entirely or in large part a result of bleeding rather than a cause of the bleeding. The authors consider that at present the term "hemorrhage due to massive transfusion" should be replaced by "unexplained bleeding in the surgical patient".

#### Bleeding Oesophageal Varices.

S. I. SCHWARTZ *et alii* (*Surgery*, January, 1959) state that "Pituitrin" and "Pitressin" are worthwhile additions to the therapy of bleeding oesophageal varices. Direct portal venous pressure measurements in patients with oesophageal varices have shown that intravenously administered "Pituitrin" results in a rapid and marked decrease in portal pressure equivalent to the level achieved by portacaval shunt. The drugs have proved effective in the control of acutely bleeding oesophageal varices and have been helpful in facilitating trans-oesophageal ligation of bleeding varices. The authors recommend that intravenously



administered "Pituitrin" or "Pitressin" be given an initial trial in the control of bleeding in view of the distinct advantages over balloon tamponade.

### Thrombo-Endarterectomy in Obliterative Arterial Disease.

N. E. FREEMAN AND G. J. NICHOLSON (*A.M.A. Arch. Surg.*, February, 1959) discuss 87 patients with obliterative arterial disease whom they subjected to thrombo-endarterectomy. In those patients operated on for claudication, relief has been obtained in 76% of the cases in which there was a follow-up from six months to six years. Of the patients operated on for ischemia, 70% had healing of their lesions or were relieved of their pain. In the whole series, the salvage rate of limbs was 78%. The authors state that morbidity is high in the ischemic group, and the death rate from cardiovascular disease in the early months is also high, nearly a third dying in the first three years. They conclude that thrombo-endarterectomy is a satisfactory operation for the relief of claudication in selected cases. They consider that thrombo-endarterectomy for ischemic lesions should be very carefully considered in view of the high morbidity and the frequency of early death from cardio-vascular disease.

### Biliary Tract Disease after Subtotal Gastrectomy.

J. S. CHAPA AND G. C. ENGEL (*A.M.A. Arch. Surg.*, February, 1959) report the results of a study performed to find out whether or not gastrectomy with the Billroth II type of gastro-jejunostomy would cause impairment of the function of concentration and emptying of the biliary system. They did this by clinical methods, namely cholecystography and estimation of the serum cholesterol level. These studies did not give any evidence of impairment of the extrahepatic biliary system in spite of the bypassing of the duodenum and upper part of the jejunum by food and gastric secretions. They state that the incidence of biliary dysfunction after this type of operational procedure is no greater than in the general population or in patients who have undergone any other type of abdominal surgery.

### Benign Strictures of the Hepatic and Common Bile Duct.

A. J. M. KARTHAUS (*Arch. Chir. neerl.*, Volume 10, Fascicule 2, 1958) describes the operations used at the Utrecht University Surgical Clinic in the treatment of benign strictures of the hepatic and common bile ducts, discussing the indications, advantages, disadvantages, results and technique. Between 1944 and 1957, 61 such operations were performed on 49 patients at the clinic. End-to-end anastomosis between the two stumps of the hepatic or common bile duct was not used in this series, because in all except two cases the duct had been destroyed over a considerable distance or the conditions in the hepato-duodenal ligament were unfavourable. In one of these two cases dilatation of the stricture was used, but was soon followed by stenosis; in the other case longitudinal division and transverse closure of the stricture were successful. The author has found that

gall-stones not uncommonly form in the gall-bladder after anastomosis between this organ and the digestive tract; he therefore reserves such operations for inoperable carcinoma of the head of the pancreas or ampulla of Vater. Cholecysto-jejunostomy was used in two cases of benign stricture in this series, once with success and once with failure. Hepatico-gastrostomy was undertaken in one case with satisfactory results, although after anastomosis to the stomach food remnants which have had very little contact with the digestive juices may enter the biliary passages and cause ascending cholangitis. Hepatico-duodenostomy was used in two cases, once with success and once with failure; the author does not favour anastomosis to the duodenum, although hepatico-duodenostomy and choledocho-duodenostomy are still being performed by many surgeons. The author prefers the use of a loop of jejunum, excluded according to the method of Roux; this avoids the laborious dissecting out of the distal biliary ducts, makes the anastomosis easier, and avoids reflux of intestinal contents. By this method choledocho-jejunostomy was used in two cases with success, and hepatico-jejunostomy was used on 25 patients, 18 of whom are still alive. In the latter operation the surgeon has to tunnel through the hepatic tissue near the hilum of the liver to reach the stump of the common hepatic duct. In the modification of Cole and Nubser a mucosal cuff is fashioned to minimize fibrosis and stenosis; by this technique hepatico-jejunostomy was carried out in 13 cases with two deaths, and anastomosis to one of the hepatic ducts was performed in two cases with success in one. In one instance it was necessary to perform Longmire's operation of intrahepatic cholangio-jejunostomy with partial hepatectomy. Finally, on three occasions it was necessary to form an external biliary fistula, either because it was found impossible to expose the remnants of the common hepatic duct or one of the hepatic ducts near the hilum of the liver, or because the patient's general condition made it desirable to complete the operation swiftly.

### Kanamycin for Intestinal Antisepsis.

I. COHN, JR., AND A. B. LONGACRE (*Surg. Gynec. Obstet.*, January, 1959) discuss the use of kanamycin, a new broad-spectrum antibiotic isolated from cultures of *Streptomyces kanamyceticus* in Japan, as an agent for intestinal antisepsis. They state that because of its broad antibacterial activity, kanamycin is in many respects similar to neomycin, and that because of its almost total lack of absorption from the gastro-intestinal tract it appeared to be worth investigation as an agent for pre-operative preparation of the bowel. The authors describe the bacteriological studies carried out. The antibiotic was administered to 12 patients for 72 hours in an oral dose of one gramme every hour for four hours, and then one gramme every six hours. They state that the results indicate that kanamycin is one of the most effective agents yet developed for intestinal antisepsis. Particular comparison is made with neomycin. There were no disturbing side effects in any of the patients. Diarrhoea,

which occurs commonly in neomycin therapy, was not observed. The authors state that the poor absorption of kanamycin from the gastro-intestinal tract, the rapid and complete control of streptococci, coliform organisms and clostridia, and the failure of either yeasts or staphylococci to proliferate during kanamycin therapy all combine to make it one of the best agents yet studied for the pre-operative preparation of the colon.

### Denervation of the Carotid Sinus in Myasthenia Gravis.

J. YOEL AND A. ALURRALDE (*Presse méd.*, April 25, 1959) report the results of denervation of the carotid sinus in eight cases of myasthenia gravis. They consider that this operation is worth performing, but that the results are best if it is done early and if the patient is young. It is relatively easy to perform, and free from immediate and remote complications. The authors operated on both sides in all cases, and only once was general anaesthesia required. The shortest interval between the two procedures was 10 days and the longest one month. In two cases the operation was performed in consulting rooms. The authors state that they employed the procedure recommended by Wilmoth, Leger, Leriche and others, with slight modifications in the light of their own experience. They have recently made a trial of the procedure in the treatment of progressive muscular dystrophy, but express no opinion on the results for the present, because of the spontaneous remissions that are characteristic of this condition.

### Aortic-Carotid Bypass Prosthesis for Pulseless Disease.

I. M. SILBER AND N. ROSENBERG (*Arch. Surg.*, March, 1959) report a case of thrombo-obliterative disease of the branches of the aortic arch, also known as "pulseless disease" or Takayasu's disease. They state that this is a condition of uncertain aetiology characterized by a lack of pulsation in one or more of the major branches of the aortic arch, with ischaemic manifestations in the area of distribution of the occluded vessels. The patient they discuss had attacks of transient hemiparesis of the right side of his body. Surgical alleviation of the condition was achieved by the establishment of a successful aortic-carotid bypass, with the use of a "Dacron" prosthesis.

### Thoracic Emergencies in Children with Staphylococcal Pneumonia.

W. W. WEISEL AND W. C. GORMAN (*Surgery*, February, 1959) discuss serious tension pneumothorax as a complication of staphylococcal pneumonia in infants and children. They state that this complication is suggested by the radiographic demonstration of radiolucent areas in the lungs of children with staphylococcal pneumonia, and that when it occurs immediate tube thoracotomy and underwater drainage are required. They report on 14 infants and children who were treated for this complication. Thirteen of the children survived and are well. The one death occurred in a child with tetralogy of Fallot, who was recovering after catheter thoracostomy for a right tension pneumothorax when she succumbed to a left tension pneumothorax.



## Brush Up Your Medicine.

### TESTS OF THE URINE AND BLOOD IN DIABETES MELLITUS.

Most of us test the urine of our patients regularly for the presence of sugar, and repeated estimations of sugar in urine and blood are necessary for good control of diabetic patients. It is often desirable to test for ketone bodies in the urine, and sometimes in the blood. New methods for carrying out these procedures have been introduced in relatively recent years, so that it is appropriate to review the subject briefly, with particular attention to the needs of the general practitioner in the country who has not immediate access to the services of a fully equipped laboratory.

#### Glucose in Urine.

##### *Fehling's Test.*

The test with Fehling's solution depends on the reduction of the blue cupric salt to red cuprous oxide. It is still quite widely used, but it has its weaknesses. The solutions are not very stable, the manipulations are a little cumbersome, and some substances such as urates, glycuronates and salicylates may give false positive results. A negative reaction is good evidence that the urine is free from significant amounts of glucose; but positive results should, in general, be checked by other methods. Fehling's test is really now an outmoded method.

##### *Benedict's Test.*

This also involves the reduction of a cupric salt to give a red precipitate. It is quantitatively more accurate than Fehling's test, the solution keeps better, and there are fewer fallacies.

##### *"Clinitest" Tablets.*

These are commercially made tablets containing a cupric salt and other ingredients which generate heat chemically when the tablet is dropped into the diluted urine. No external source of heat is required. The results are similar to those obtained from a carefully performed Benedict's test and are fairly quantitative. Convenience and simplicity are the main advantages. A minor disadvantage is the tendency for the tablets to deteriorate and turn blue if the screw top of the container is not promptly and scrupulously replaced. An increasing number of diabetics employ "Clinitest" for their routine urine examination.

##### *Glucose Oxidase Strips.*

These utilize a chemical reaction in which glucose, in the presence of the enzyme glucose oxidase, is oxidized to form gluconic acid and hydrogen peroxide. The peroxide, in turn, converts orthotolidine, in the presence of a peroxidase enzyme, into a blue colour. These agents are incorporated in a paper strip and supplied in the form of "Tes-Tape" or "Clinistix". A length of strip is dipped into the urine and removed. If glucose is present, a blue colour develops. The intensity of the colour which is obtained after one minute may be compared with a colour chart in order to obtain some quantitative assessment of the concentration of glucose in the urine. This test is quite specific for glucose and there are no false positive results, though hydrogen peroxide will also turn the strip blue. It must be realized that in the copper reduction tests, reactions will be obtained with the other reducing sugars, such as lactose or fructose, in just the same way as with glucose, but in the oxidase tests this is not so. The oxidase strip tests are more sensitive than the older methods and are capable of estimating 0.1% of glucose in solution.

##### *Comment.*

It should be clear that, from the viewpoint of simplicity, sensitivity and specificity, the oxidase strips are ideal for routine examination of urine for glucose. It is reasonable to suggest that their use should now supersede the older methods for the exclusion of glycosuria in the practitioner's surgery and the hospital side-room. There is some difference of opinion, however, as to whether they are quite suitable for the diabetic patient to use in the day-by-day management of his malady. It seems that concentrations of glucose over 1% may give similar intensities of blueness, so that gross degrees of glycosuria may be missed. Again, the extra sensitivity of the method may lead the patient to believe that the amount of glucose he is excreting is greater than is in fact the case, so that his dose of insulin may be unnecessarily

increased. The strips prove very satisfactory for the control of the mildly diabetic patient, whose urine may safely be kept sugar-free by means of diet, tablets given by mouth or small doses of insulin. For the time being, the person with more severe diabetes who requires larger doses of insulin is probably wiser to continue to test his urine by means of Benedict's reagent or "Clinitest".

#### Ketones in Urine.

##### *Rothera's Test.*

This standard test for urinary ketone bodies is highly sensitive and quite specific. In general, the diabetic patient who shows heavy glycosuria and a positive response to Rothera's test is in urgent need of intensive insulin therapy. Some labile diabetic children may occasionally show a positive response to Rothera's test even though their control is satisfactory; but one should not accept this explanation without careful review of the whole treatment.

##### *"Acetest" Tablets.*

These are commercially prepared tablets which detect the presence of ketone bodies when moistened with a drop of urine. The procedure is much simpler than Rothera's test, and a bottle of the tablets may well find a place in every practitioner's bag for use at the bedside.

#### Glucose in Blood.

The diagnosis of diabetes mellitus should not be made on urine tests alone, though the finding of heavy glycosuria in association with symptoms of diabetes, such as thirst and polyuria, will be strong presumptive evidence of such a diagnosis. Whenever possible, accurate studies of the blood sugar content should be made to confirm the urinary results. The glucose tolerance test is commonly employed for this purpose, and it is essential when glycosuria is mild or intermittent and the fasting blood sugar level is borderline. However, routine employment of the glucose tolerance test in all cases is unnecessary and may waste valuable time. For example, if a patient is passing large amounts of glucose in his urine and a random blood sugar level of 300 mg. per 100 ml. is obtained, then the diagnosis of diabetes mellitus is amply confirmed and treatment should be commenced promptly.

Most diabetic patients can be adequately controlled by regular testing of the urine. In some, however, the renal threshold for glucose may be abnormally high or abnormally low, so that prescription of treatment based on urine tests alone may be quite fallacious. For such patients frequent blood sugar estimations are essential, and treatment should be ordered according to these results rather than to the results of urine examination. It is also wise to check even the apparently well-controlled diabetic with blood sugar tests from time to time.

Some laboratories use venous blood, others capillary blood for their tests. The results will be similar for fasting specimens; but peak values tend to be 20 to 30 mg. per 100 ml. lower with venous samples. It is customary in Australia to estimate the total amount of reducing substances in the plasma and report this as the level of the blood sugar. When methods which estimate true plasma glucose content, such as that of Somogyi, are employed, the results will be about 20 mg. per 100 ml. lower.

Although accurate estimation of blood sugar content is not a difficult technical procedure, it does require some special equipment and careful manipulation. Methods employing the "Clinitest" principle applied to deproteinized blood have been described (Davies *et alii*, 1957); these are much simpler and could be widely used if their accuracy was assured. It seems, however, that the results are useful for rough screening, but not precise enough for the diagnosis and control of diabetes. It is hoped that refinements of the enzyme methods may be introduced which will enable the practitioner to estimate blood sugar content readily and accurately.

#### Ketones in Blood.

Estimation of the level of ketones in the plasma is one of the most useful methods of judging the severity and progress of diabetic coma, and is particularly valuable when facilities for frequent blood sugar studies are not available. The method is simple, and either the nitroprusside powder test or the "Acetest" tablet test may be used. The details of carrying out the test and the information to be derived from it have been described very clearly by Heale (1958). The nitroprusside powder is prepared as follows: sodium nitroprusside, 1 gramme (very finely powdered); ammonium

sulphate, 20 grammes; sodium carbonate (anhydrous), 20 grammes. These are evenly mixed together. One drop of plasma is added to a small heap of the powder on a white card, and the colour is noted after one minute. The intensity of the purple colour that develops will indicate the concentration of ketone bodies. If a strongly positive reaction is obtained, the test may be repeated after dilution of the plasma with an equal volume of water.

#### Conclusion.

1. The oxidase strips for testing for glucose in urine are easy to use, sensitive and specific. They should ultimately replace the older copper reduction methods.
2. "Acetest" tablets are simple and reliable for estimating ketones in urine.
3. Careful blood sugar studies are essential for the diagnosis of diabetes mellitus. Simple bedside methods are not yet sufficiently reliable.
4. The estimation of ketones in the plasma is a valuable aid in the management of diabetic coma.

Sydney.

KEITH HARRISON.

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## Clinico-Pathological Conferences.

### A CONFERENCE AT SYDNEY HOSPITAL.

A CLINICO-PATHOLOGICAL conference was held at Sydney Hospital on January 20, 1959. Dr. N. Rose, the Medical Superintendent, was in the chair, and the principal speaker was Dr. W. H. WOLFENDEN.

#### Clinical History.

The patient was a woman, aged 66 years. She had married at 29 years of age, had had one normal pregnancy at 31, and had had no serious illnesses or operations. Her mother had died at the age of 59 years from heart trouble and her father at 71 from pernicious anaemia and diverticulitis; two sisters were alive and well.

Two weeks before her admission to hospital she complained to her doctor of weakness of the left hand present for one month, an increase of half a stone in weight in one year, nausea on exertion for two years and dyspnoea on exertion for four years. Weakness of the left hand was the main symptom, and she attributed this to a fall onto her left shoulder six years previously; but for the last month this had become worse, and she was having trouble holding things. Four days before her admission to hospital she had become light-headed and slightly deaf, and in the course of the next two days she became dazed and disorientated. At midnight prior to the day of her admission she collapsed in her bathroom, and it was noted that her face was contorted, her mouth was twitching, her eyes were fixed and glazed, and her skin was ashen and cold. Her doctor gave her an injection, and she went into a deep sleep, during which her right arm and leg twitched spasmodically although the limbs on the left side remained still. Another similar spasmodic episode occurred at midday next day, and she vomited and was incontinent of urine and faeces.

She was admitted to hospital soon after this, and was found to be obese and comatose, responding only to painful stimuli. Her pupils were equal and reacted to light, and there were slight dilatation and tortuosity of retinal veins with early nipping. An upper motor neuron type palsy of the left facial nerve was present, but all other cranial nerves seemed intact. Bilateral Hoffmann's sign, generalized hyperreflexia (more marked on the right), absence of abdominal reflexes and a bilateral Babinski sign were also noted. There was spasticity of the right limbs, but occasionally she moved them voluntarily. There was flaccid paresis, and no movements were noted on the left side. The blood pressure was 180/100 mm. of mercury and the pulse rate 84 per minute with sinus rhythm. There were no other abnormalities noted in the cardiovascular system. She had a temperature of 101° F., and examination of her urine showed "one-third" protein. Other-

wise the only significant findings noted were thin, coarse hair and scanty eyebrows. Interrogation of the relatives revealed that she had a marked preference for the cold weather. Her doctor said that her usual blood pressure was 150/100 mm. of mercury.

Management comprised supportive measures, feeding by tube, the use of an indwelling catheter, etc.; but early the next day she suddenly developed loud crowing respirations, became cyanosed and died within three minutes, never having recovered consciousness.

#### Clinical Discussion.

DR. W. H. WOLFENDEN: One of the most interesting features of clinical medicine is when one is called upon to act as a sort of medical Sherlock Holmes, to sift the clues, weigh the evidence and examine the various suspects. And so I would like to approach this problem in the manner of a medical detective, in the hope that I will be able to display some small part of the perspicacity which Conan Doyle bestowed upon his hero, though not, if I remember, upon his medical colleague.

Firstly, let us analyse this evidence and decide upon its significance, and then endeavour to use it to incriminate the various suspects. The first main clue is the complaint of weakness of the left hand. This is stated to have been present for one month, but is said subsequently to have become worse over a period of a month and to have been attributed by the patient to a fall on the left shoulder six years before. Therefore I suspect that some trouble with the left hand might have been present for quite some time. Such weakness, of course, may be due to any number of different causes, locally in the hand, in the peripheral nerves, in the spinal cord or in the brain; but I think subsequent events justify us in assuming the cause to have been cerebral.

The next clue is the development over a four-day period of symptoms of a diffuse cerebral disturbance. The patient became light-headed, dazed and disorientated, but apparently did not complain of headache over this period. I must therefore assume that a rapidly progressive and fairly generalized cerebral disturbance was occurring, which was probably not due to increased intracranial pressure because of the absence of headache—in fact, the patient felt light-headed.

Thirdly, whatever this process may have been, it then quite suddenly rendered the patient unconscious, and severely damaged the right hemisphere causing complete left-sided paralysis.

Now I have assumed from my second clue—that of progressive mental deterioration—that there is generalized damage at a high level in both hemispheres, not only in the right one. Further evidence supports this for the right extensor responses. Such signs on the same side as the lesion, of course, frequently occur in strictly unilateral disease, when raised intracranial pressure supervenes causing herniation of the temporal lobe through the tentorium and compression of the opposite crus, without actual damage to the opposite hemisphere. However, firstly, there were no symptoms at this stage to suggest intracranial hypertension, and secondly, I would draw your attention to the spasmodic twitching which occurred in the right arm and leg, suggesting to me left hemisphere cortical damage rather than compression of the left crus much further down. Do any other clues help us in this vital decision between bilateral dysfunction caused by high intracranial pressure on the one hand and primary diffuse bilateral disease on the other?

There are a number of other clues which may be significant, and one or two which have me baffled, such as nausea on exertion; but only one more should really be required to enable us to have a fair idea of "who did it". This clue is the blood pressure of 180/100, the records of 150/100 before the onset of the illness and the pulse rate of 84. Significant high intracranial pressure now seems even less likely in the absence of any definite alteration of blood pressure and pulse rate.

I therefore postulate a disorder which has caused a strictly localized defect of the right hemisphere resulting in a weak left hand for some weeks, and which then begins to cause progressive bilateral damage, and finally sudden, severe right hemisphere paralysis and considerable left hemisphere damage as well, in the absence, at least initially, of significant elevation of intracranial pressure.

We shall now endeavour to make a case against the following suspects who are all being held on suspicion: they are cerebral neoplasm, intracranial vascular accidents such as subdural haematoma, cerebral haemorrhage, throm-



bosis and embolism, aneurysm of a cerebral vessel, infections like syphilis and encephalitis, and finally demyelinating disease.

The suddenness of the collapse on the bathroom floor, unconscious and with a left-sided hemiplegia, is very suggestive of a vascular accident; yet such an apoplectic-form onset is by no means uncommon in cases of cerebral tumour. Such an event is often ascribed to hæmorrhage into the tumour; but this is not always demonstrable *post mortem*. A tumour in the right prefrontal region might have accounted for the present clinical picture of initial weakness of the left hand and later hemiplegia and unconsciousness, and it may be difficult to exonerate this suspect completely—his alibi is not good. Headache, however, might have been expected and occurs early in prefrontal tumours; yet there is no mention of it in the story. Again, as I have mentioned in discussing the clues, bilateral signs in unilateral cerebral tumour are usually due to raised intracranial tension with temporal lobe herniation and compression of the opposite crus. But in this case I am laying considerable stress upon the initial mental impairment without headache and vomiting, and later the normal blood pressure and pulse, suggesting bilateral hemisphere disease with raised intracranial pressure, and upon the spasmodic twitching which occurred in the right arm and leg, which I think is probably epileptic in nature. In other words, I think there is a diffuse disturbance in both cerebral hemispheres rather than primarily in one with subsequent herniation through the tentorium or raised intracranial pressure. On these grounds cerebral tumour is not my number one suspect, though very difficult to exclude.

Perhaps there were multiple metastatic tumours present; yet our patient had gained weight rather than lost it, and this is by no means the slowly progressive story we see in cerebral metastatic lesions.

It may be difficult also to convince you of the innocence of subdural hematoma, whose alibi, however, is somewhat better. There is no history of head injury or of any serious underlying disease as a possible cause. Headache would certainly have been expected, and the presenting focal symptom was a very localized one rather than an insidious hemiplegia, and again there has been no pupillary change noted suggesting the Hutchinson's pupils of cerebral compression.

Cerebral hæmorrhage has just as sudden onset and disastrous consequence as the present case; but we can safely exclude this suspect altogether, for he strikes usually unheralded, and certainly not after promontory symptoms of some weeks' duration and then mental deterioration over some four days. Also in cerebral hæmorrhage the blood pressure is almost always high, and we know that it was not unduly elevated here either before or during the illness.

Cerebral thrombosis may have focal prodromal symptoms, but surely not for this length of time, and it is difficult to imagine how such rapid, widespread cerebral dysfunction would have been produced unless a vessel such as the basilar had been involved, and there are no brain-stem features here to suggest this and prodromal features very much against it.

Aneurysm of a cerebral vessel seems to me very unlikely. There was no headache, and no signs of meningeal irritation are recorded. Again, a prodromal weakness in one hand is surely unusual, as such localized weakness seems to point to a cortical disturbance where body representation is more widely spread out, and aneurysms on the cortical vessels are unusual rather than to the base of the brain, where tracts are so compact and aneurysms so common.

Syphilis is so traditional a suspect in all neurological detective work that I propose to let it off lightly, except to say that, although syphilitic arteritis is a possibility, there are absolutely no clues to suggest it.

In encephalitis one would not expect focal features to precede the general illness by weeks, but to occur in it, and disseminated sclerosis is included more for completeness, for although there is an acute and fulminant form of the disease, this really does not sound anything like it.

Having apparently excluded all my suspects, I am left with the problem of finding yet another capable of producing a simple focal symptom and then, in one swift attack, producing generalized cerebral disturbance. The undoubted criminal in many such cases is atheroma, not in its usual site along the middle cerebral arteries, but where it thinks people will not notice it, in the large stem vessels—the carotids and basilar arteries.

The cerebral arteries, long thought to be end-arteries, have in fact a very extensive potential for collateral development, especially when ischæmia occurs gradually. Thus when atheroma gradually narrows a carotid artery, blood may be shunted into its branches by the circle of Willis, by end-to-end loop anastomoses between its branches and those of the basilar system, and through anastomoses between capillary beds. Certain areas in the supply of the narrowed carotid will become ischæmic as the narrowing increases, or as atheroma begins to affect the opposite carotid or the vertebral-basilar system, and such ischæmic areas presumably are those furthest away, as the blood flows via devious anastomoses from the source of blood supply.

This gives rise to the clinical picture of cerebral vascular insufficiency, the initial symptoms of which are typically transient and recurrent, and the exact mechanism of which is not adequately understood, although they respond well to anticoagulant therapy. Sometimes the onset is with a series of little or partial strokes increasing stepwise till final complete occlusion. Such may have been the case here, though we lack detailed information about the initial weakness of the left hand—as to whether it was constant or remittent, progressed steadily or in fits and starts.

I therefore put it to you that the picture in this patient was one of marked atheroma of both carotids and probably of the vertebral-basilar system as well, so that both hemispheres received only just enough blood with the exception of the hand area of the right side where collateral supply was not quite good enough. Then quite suddenly the right carotid began to thrombose. This rendered the right hemisphere severely ischæmic, causing left-sided paralysis, and further embarrassed the left side, whose carotid is none too good either, causing right-sided epileptic twitching because of cortical ischæmia.

My provisional diagnosis is therefore atheromatous insufficiency of the carotid vessels and probably of the vertebral-basilar system too, with final thrombosis in one carotid—I should think the right one.

There are a few remaining clues. The patient was obese, had been gaining weight and had thin, coarse hair and scanty eyebrows. In spite of an unreasonable preference for cold weather, it may be that myxœdema is here a factor underlying or accelerating the development of her atheroma.

A temperature of 101° F. is quite compatible with a wide range of cerebral disasters and their infective complications, and albuminuria, even quite massive, may occur in cerebral vascular accidents—we have no evidence available to involve the kidney in any primary disease.

Finally I must state that it is very difficult to exclude tumour altogether, and it must be kept in mind as a secondary possibility, with subdural hematoma as a very poor third. It only remains for me to hope that the pathologists will see fit to bring in a verdict of thrombosis of the carotid artery on the basis of atheromatous insufficiency of these vessels.

Dr. N. Rose: You have heard a most excellent presentation and discussion of this case. To a neurologist a case summary of less than a page must seem a sparse document. Any further information required will be provided.

Dr. Wolfenden: As I have made a diagnosis of thrombosis superimposed on an insufficiency syndrome, and as the diagnosis of such an insufficiency syndrome is essentially a clinical one, in the absence of angiography, I would like to know if any further details are known about the nature and duration of the weakness of the left hand, and if there is any knowledge of visual disturbance.

Dr. P. A. Castaldi: Unfortunately no further details are available.

Dr. H. M. Whyte: I would like to ask Dr. Wolfenden to discuss further two points he has mentioned. One is the rise of blood pressure in cerebro-vascular lesions, if he can inform us of the mechanism, and secondly, the possible occurrence of proteinuria and its relation to the cerebral event.

Dr. Wolfenden: Dr. Whyte has chosen two very difficult questions. I have been discussing the association of rising blood pressure with raised intracranial pressure. On teleological grounds this may be explained by the necessity for an increased blood pressure to maintain cerebral circulation in the presence of raised intracranial pressure. The exact mechanism of this is unknown to me. As



regards the second point, the exact mechanism of this is also unknown. Massive albuminuria may occur, for example, in subarachnoid hemorrhage. A neurogenic origin has been postulated utilizing the splanchnic nerves, but no proof of this is available.

DR. K. B. NOAD: It is a very common observation that in acute cerebro-vascular conditions the blood pressure rises. It is said not to be due to an increased intracranial pressure but to medullary ischaemia. The mechanism of the albuminuria is quite unknown. It is possible that it may have the same mechanism as glycosuria that so commonly occurs in acute cerebro-vascular disturbances.

It is almost presuming to discuss this case further after Dr. Wolfenden's masterly conduct of it. I completely agree with his presentation and diagnosis, although I did feel that subdural hematoma was a possibility. Strangely enough, it is not necessary to have a diffuse atheroma of the cerebral vessels to arrive at a picture such as this patient presented. Quite frequently an isolated plaque of atherosclerosis just beyond the bifurcation of the carotid may be responsible for a process such as this.

DR. ROSE: Perhaps Dr. Whyte could answer his own questions.

DR. WHYTE: I agree with Dr. Noad that the evidence is in favour of ischaemic lesions causing a rise in blood pressure in these conditions. I do not regard the raised intracerebral pressure as in cerebral tumour as a sole cause. Creation of ischaemic lesions in the brains of animals has been one experimental method inducing hypertension. Some patients being treated with ganglion-blocking agents once more become grossly hypertensive after a cerebro-vascular lesion, and become relatively or absolutely unresponsive to treatment with ganglion blockage. I have no idea why proteinuria should occur under these circumstances.

PROFESSOR W. K. INGLIS: Was there any investigation of the cerebro-spinal fluid, and if so, what did it reveal?

ORGANIZER: No lumbar puncture was performed.

DR. WOLFENDEN: Does anyone know if blood pressure had been recorded during attacks of either carotid or basilar insufficiency, when, especially in the case of the basilar system, there may be medullary ischaemia?

ORGANIZER: No.

DR. J. W. LANCE: The case against the carotid certainly appears conclusive. There is perhaps one point against this, and that is that the patient noticed weakness of one arm for some considerable time before the final onslaught. It is unusual for an insidious onset of weakness to occur in internal carotid thrombosis or insufficiency. It is, therefore, possible that this patient had, in fact, had a tumour for some considerable time in the right hemisphere. This could be a glioma which has spread across to the other hemisphere in the later stages of the disorder, through the corpus callosum, under the falx, as sometimes happens. This would account for the final bilaterality of the disturbance. Sometimes a parasagittal meningioma may also produce signs on both sides of the body. Possibly, too, a tumour in the region of the hypothalamus could cause such a picture. Clues in this direction include the increase in weight, and change in body hair, which may perhaps be interpreted as suggesting hypopituitarism, although this is a little fanciful. The nausea on exertion and preference for cold weather are both difficult points to explain.

If there were a tumour in the region of the hypothalamus, the final episode would perhaps be interpreted as a so-called "third ventricular attack", and possibly the weakness on both sides and twitching of one could result from a deep mid-line lesion in that situation, although this is unlikely.

Dr. Wolfenden mentioned that subdural hematoma had a good alibi, but we must remember that it always has. Hence we must always suspect its presence until full investigation has been performed and sometimes until the pathologist has had his say. However, in this case there is really nothing other than a disturbance of consciousness to indicate this possibility.

Finally I must agree with Dr. Wolfenden that there are three possibilities in this case—carotid atherosclerosis, tumour or even subdural hematoma.

DR. W. E. L. DAVIES: Dr. Lance has cast some doubt on the guilt of atheroma in this case. I feel that there is some more circumstantial evidence for the presence of atheroma. We have dyspnoea in the last four years, suggesting perhaps some coronary atheroma, as well as weight increase, we have a blood pressure of 150/100 mm.

of mercury normally, and 180/100 mm. on this admission, suggesting atheroma of the aorta giving a widened pulse pressure. These points may be taken as evidence that a large vessel like the carotid artery could also be affected by atheroma.

DR. B. M. HURT: I can make no further contribution to the diagnosis. However, I am interested to know what diagnostic steps could be taken were this patient seen a second time. Three treatable causes have been mentioned. The first is the carotid insufficiency syndrome which we should perhaps seek more often. The second is subdural hematoma and the third, cerebral abscess. Could Dr. Wolfenden outline some methods of investigation in such a patient?

DR. WOLFENDEN: The basic step in the diagnosis of cerebral vascular insufficiency is a history of hemiplegia or hemianesthetic or hemiparasthetic disturbance of very short duration, recurring frequently, with complete clearing between attacks. The entire process is commonly extremely stereotyped. Sometimes there is a history of visual disturbance in the eye on the side of the diseased carotid. These two factors combined must arouse strong suspicion of this condition. Some patients develop their disturbance in a stepwise manner. Presumably such patients have progressive thromboses in a lamellar fashion, each layer increasing the severity of the neurological disturbance.

In the case of the basilar vessel the picture is not so stereotyped, and the neurological defect tends to vary from time to time in site and content. Thus a patient may suffer transient hemiplegia first on one side and later on the other. In addition there are symptoms referable to the brain stem, such as diplopia, dysarthria and giddiness, the latter being very common. Disturbances of consciousness also occur much more commonly in basilar artery disturbance.

The only way to obtain definite proof is by arteriography to demonstrate a block or narrowing of the carotid or basilar artery. Another test performed recently uses digital pressure on the orbit to raise intraorbital pressure, causing first pulsation and then occlusion of fundal vessels observed with the ophthalmoscope. Comparison of the pressures needed on the two sides to occlude retinal vessels gives some measure of retinal arterial blood pressure. There is now an ophthalmodynamometer available to measure this pressure accurately. A difference of 10 mm. of mercury in either diastolic or systolic retinal arterial pressure is significant, and suggests insufficiency of the carotid on the side of the lower reading. In basilar artery insufficiency, the retinal arterial pressure tends to be raised on both sides, presumably due to shunt in cerebral blood flow via the carotids. Palpation of the carotid vessels in the neck is not reliable, and the same can be said for palpation of the vessel in the tonsillar fossa.

DR. HURT: Is it known in which arm the blood pressure was recorded, and was it recorded from both arms?

ORGANIZER: No.

DR. HURT: If it were known that there was a difference in blood pressure between the arms, there is a possibility that involvement of the carotid artery need not be in its upper reaches, but close to the aortic arch. It is possible to have atheromatous occlusion of the major vessels coming from the aortic arch when the blood pressure may be different in each arm.

#### Pathological Report.

DR. A. A. PALMER: The patient appeared somewhat younger than the stated age (66). Body weight was 139 lb. and height 5 ft. 7 in.

The thyroid gland was a little pale, but otherwise appeared normal. The pleural cavities were normal.

Both lungs were light (each weighing 13 oz.). The pulmonary artery and both branches were almost occluded by thrombus of mixed appearance, slightly adherent to the lining. The cut surfaces of both lungs were rather pale and showed thrombi in small branches of the pulmonary arteries. The heart was a little enlarged, weighing 13 oz., the pericardial fluid was slightly increased. Both coronary arteries showed advanced atheroma with narrowing, the lumen of the right being almost obliterated 2 cm. from its origin for a distance of 1 cm. No abnormalities were found in the chambers, valves or orifices.

No abnormalities were found in the abdominal or pelvic organs.

In the brain, the right fronto-parietal and part of the right temporal cortex were softened. A limited area of the

left anterior frontal cortex was also softened. The cerebral arteries were free from atheroma, but both internal carotid arteries were atheromatous and occluded by mixed thrombus extending from the bifurcation to the base of the skull.

#### Diagnosis.

- (i) Bilateral internal carotid artery atheroma with thrombosis. (ii) Pulmonary artery embolism or thrombosis. (iii) Severe coronary atheroma.

## Out of the Past.

*In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.*

### THE TRANSFERENCE OF PHTHISICAL PATIENTS TO AUSTRALIA.<sup>1</sup>

[From the *Australasian Medical Gazette*, September, 1884.]

A JUST COMPLAINT has recently been made at the general meeting of the subscribers to the Lomonton Fund in Adelaide, as to the reckless manner in which medical men at home ship off hopeless cases of phthisis to these colonies. This is apparently done in ignorance that advanced cases receive no, or but little, benefit by residence here, and that those in the early stages require the dry and cool air of the more elevated and inland portions of Australia to really regain their health, and that a prolonged stay in the moist warm heart of the coast frequently not only fails to arrest the disease but really hasten their end. We may fairly ask in the interests of the patients themselves, and of the people here, that medical practitioners in Europe will make some enquiries as to this part of the world, and in the knowledge thus acquired advise their patients as to their proceeding here at all, or if so to what particular part. Nothing can be more inconsiderate or inhumane than to ship off phthisical patients to the other end of the world, where they have no relatives or friends, with perhaps but a few pounds in their pockets, to die certainly and quickly amongst strangers.

## Correspondence.

### RADON IN THE TREATMENT OF EUSTACHIAN TUBE DISEASE.

SIR: One of the most useful services an otologist can perform is the prevention of deafness and minimizing the degree of deafness in the young. Because so many cases of recurrent otitis, with impaired hearing, result from disease in the Eustachian tubes, treatment of this area is extremely important.

For about 20 years now, treatment of this sort has been regularly given by many of Sydney's specialists by means of a radon applicator with a considerable amount of activity. There are very many children known to the writers and to many other specialists who have derived great benefit from this treatment. It has been beneficial to some adults too. There is no substitute treatment that gives the same or similar result without other serious drawbacks.

After this quite considerable experience in Sydney—and there is much wider experience to draw upon, because the treatment has been widely used—no record has appeared anywhere of harm occurring to anyone through the radiation treatment or through handling the apparatus.

Earlier this year, stringent regulations were introduced under the *Radioactive Substances Act* that made it too burdensome for the treatment to be carried out by individual practitioners because of the size and weight of the container, and it appeared that treatment would be possible only in hospital centres. This would have been

more economical in some ways; but the importance of the handling by many otologists, spread over the city and each with only a few patients, was that such a method gave a big safety factor, in that no one had the applicator for more than a brief period. Concentration in hospital created a new hazard in increasing the time during which treatment was to be carried out in one place.

New advices have now been received that no licences for this work are to be given in New South Wales at all, and therefore, such treatments must cease altogether.

One acknowledges the need for caution in handling live radioactive substances; but one dares to say quite plainly that it does seem that non-existent hazards have been called forth to lead to the suppression of a valuable and successful form of therapy.

Let us hope that the authorities will look again, and if the regulations are such as to preclude the permission for this treatment, it might be possible even to examine the need for such stringency as exists in the framing of the regulations so that a way can be found to permit a return to a desirable form of therapy.

Yours, etc.,

RAMSAY BEAVIS, ERIC P. BLASHKI,  
A. B. K. WATKINS.

Sydney.  
Undated.

### CHLOROTHIAZIDE: A NEW APPROACH IN THE TREATMENT OF HYPERTENSION.

SIR: I read Dr. Stuckey's timely article on the above subject with interest. While being in entire agreement with most of its contents, I feel that one of his statements needs amplification to avoid possible misinterpretation. This is the reference to Table II of the article in the words: "a range of estimation . . . which give the same estimated mean arterial pressure and which are therefore assumed to have the same significance as an assessment of the hypertensive state." This, of course, may be true; but it is only so if the cardiac output is identical in each case, and from the work of Starr *et alii* patients with widely differing pulse pressures are likely to have different stroke volumes and probably have different cardiac outputs. Also, as Dr. Stuckey states, relative rigidity of the aorta will lead to a high systolic pressure.

Wiggers,<sup>2</sup> in fact, states that many discrepancies exist between the degree of hypertension and the calculated total peripheral resistance, so that some patients have a high mean pressure with a nearly normal total peripheral resistance, and others have a relatively slight elevation of mean pressure with a high total peripheral resistance. Under these circumstances it is probably unwise to place too much reliance on mean arterial pressure as an index of the significance of a particular patient's blood pressure.

Yours, etc.,

149 Macquarie Street,  
Sydney.  
September 24, 1959.

W. A. SELDON.

### DILATATION OF ONE PUPIL AFTER A FALL.

SIR: I have a case of marked dilatation of the pupil of one eye following a fall in which the head was struck on a wall or concrete path. The difference in diameter of the pupils, while quite marked during the few days following the fall, became gradually less noticeable until, 10 days after the fall, it was only slight, and had become periodic in occurrence. Six weeks after the fall a periodic phenomenon of variation in size is still present. This may or may not have been present before the fall.

Mrs. C., aged 43, came to my surgery and told me that she had fallen rather heavily on a concrete path at her home that morning. She seemed to be mainly concerned about various abrasions, particularly on her legs. She said that she had been quite dazed by the fall, but thought that she must have struck her head either on a brick parapet or on the concrete path, but she was not at all clear as to what had happened.

I found a generous-sized, tender lump in the right parieto-occipital region. Her right pupil was much larger than the left and did not react to light. There was ptosis of the

<sup>1</sup> *Circulation*, 1954, 9: 648.

<sup>2</sup> "Circulatory Dynamics", Grune and Stratton, New York.

<sup>1</sup> From the original in the Mitchell Library, Sydney.

left eyelid; but this latter, she said, had been noticed for years. Examination of the central nervous system did not reveal any other abnormality. The marked difference in size of the pupils had not previously been noticed by the patient, her husband or her daughter. At the end of the following week, during which she had rested at home, she found in the early morning that the pupils were equal, and somewhat relieved, she went to her usual work. The next morning the right pupil was again much larger than the left and remained so for several hours. On this occasion I saw her and noted that the tongue, which previously had been protruded straight, was now deviated to the right. I could not relate this sign neurologically either to the accident or to the variable pupil.

During the ensuing week the patient suffered one attack of fairly severe left frontal headache, but recalled that she had been subject to similar headaches for some years. An X-ray of the skull did not reveal any abnormality. After recovering from the shaking-up due to the fall the patient felt very well and, apart from the one headache, was free of symptoms. She was able to resume her work and normal routine.

Consultant Dr. George Selby kindly agreed to see the patient for me about 10 days after the fall, and with his concurrence I quote the following extract from his report on this rather interesting case:

When we first examined Mrs. C. her pupils were equal but during the 40 minutes of our interview, I noted a temporary relative increase in size of the right pupil, which returned to normal spontaneously within a few minutes. Both pupils reacted normally to light and convergence. The optic discs and fundi were normal and external ocular movements full in all directions. The protruded tongue deviated a little to the right but I felt that this was due to a slight asymmetry of her bite and deviation of the lower jaw when she opened her mouth. Neurological examination revealed no other abnormality to indicate organic brain damage.

I do not think that we need to be concerned over the variation in size of the right pupil, and suspect that this may have been present, but overlooked, for some time before her recent accident. I have seen two similar cases in the last eight or nine years, and in neither of them was any organic abnormality found, and the condition may simply be regarded as a curious anomaly of innervation of the pupil without serious pathological significance.

The periodic phenomenon which this patient's pupils exhibit, six weeks after the fall, resembles that described by Sir W. Stewart Duke-Elder in his "Textbook of Ophthalmology" (Volume 4, Chapter 44, page 3763). The variation in size in the case under review always involves, on the occasions when it has been observed, dilatation of one pupil with the other one remaining static. This resembles Duke-Elder's "sympathetic spasm", though apparently lacking the phase of sympathetic paresis which he describes as part of this phenomenon.

21 Rohini Street,  
Turramurra, N.S.W.  
September 9, 1959.

Yours, etc.,

JOHN DYKES.

#### A SECOND MEDICAL SCHOOL FOR NEW SOUTH WALES.

SIR: Many medical graduates will have learnt with concern of the decision by the Government to establish the second medical school within the grounds of the Prince Henry Hospital at Little Bay. As one of the members of the Advisory Medical Committee on the establishment of a second medical school in New South Wales, which was appointed by the Minister for Health in 1953, may I say that this decision represents a complete reversal of the principles laid down by the majority of members of the Committee.

In a memorandum attached to the official report, I commended certain features of the report, notably the recommendation "that the second medical school be established in the grounds of the University in close proximity to the building which is to house the new Faculty of Arts". I stated, *inter alia*: "This decision, if implemented both in the spirit and the letter, will ensure and preserve the academic character of the new school and fit it to produce graduates worthy of a great and liberal profession."

In the report issued by the committee it is stated:

The Committee, by majority, would not countenance any alternative to the fact that pre-clinical subjects should be taught in the University in the Faculty of Medicine in a building within the University grounds. It urges that the University in determining the site for the pre-clinical school should endeavour to ensure that there will be the closest possible physical association between the Faculty of Medicine and the Faculties of Arts and Science.

Further, the Committee quoted the following passage from the Goodenough Report:

We commend that in future only medical schools that are integral parts of universities should undertake the training of undergraduate medical students. To agree to the training of medical students in institutions which are not parts of universities is to support the belief that doctors can be produced in intellectual circumstances that are not the best that the community provides. We cannot accept such belief. Medicine is a branch of human thought and activity that demands and provides opportunities for the fullest development of humanistic and scientific talents. It is a branch of higher learning, and the most favourable training ground for those who follow it is in the recognized centres of higher learning—the universities. We are certain that it is as full participants in the life of universities having close associations with those following other branches of learning, that teachers of medical students will receive the strongest stimulus to give their best, and medical students will be encouraged to develop those qualities of mind and character that make a good doctor.

The report of the Advisory Committee was signed by all members of the Committee except two, and among those who signed was the Vice-Chancellor of the University of New South Wales, who was Deputy Chairman of the Committee. Now it would appear that the very reasons advanced last year for the location of the second medical school within the grounds of the University at Kensington—reasons used to still the voices of those members of the medical profession who wished it to be established on the North Shore line or at Parramatta or at Newcastle—had no material substance. The new school is to be built four and a half miles away, as the crow flies. I wish to dissociate myself from this decision, which I regard as an error of the greatest magnitude. The University of Sydney, which accommodates twice as many students as the University of New South Wales, has all its faculties either on the original land granted to it or on the new precinct in contiguity with it. Recently, with the consent of the legal profession, it decided to move the Law School from Phillip Street to a new location within the gates of the University on Parramatta Road. The object was to allow students of a great profession to move for at least a few years in close association with students of other faculties. Now the University of New South Wales does the very reverse with the new Faculty of Medicine, placing it in academic isolation from the main University.

Did the Government make its decision on advice given it by the Council of the University of New South Wales? If it did this, it is not too late for Cabinet in its wisdom to refer the matter back to the University for a second thought. If it does, it will win the gratitude of all members of our profession who wish the second medical school to be the equal of the first and are anxious that the University of New South Wales should not make mistakes which have been avoided by its sister University.

Woollahra.  
October 1, 1959.

Yours, etc.,  
C. G. McDONALD.

#### PENICILLIN'S DARK SHADOW.

SIR: Very mindful of your leading article of February 14, 1959, I have to report a case.

On July 21, 1959, my patient, aged 31, a woman with cellulitis of the lobe of the ear, died following an injection of procaine penicillin, 900,000 units, into the deltoid muscle.

Approximately one minute after injection she complained of a bad taste, then of feeling terrible, and she collapsed completely while being assisted to a couch. Radial pulse was imperceptible, there was trismus, froth at the mouth, contracture of muscles of extremities. Heart rate was



slow, respiration spasmodic. Intramuscular adrenaline (0.5 ml. of 1:1000 adrenaline tartrate) followed by artificial respiration was ineffective.

Recurrent tonsillitis had been treated with procaine penicillin in January, June and October, 1958. On June 21, 1959, a cellulitis of the left ear and cheek was treated with intramuscular procaine penicillin and improved, so that the patient did not report for follow-up treatment. Similar injection on July 21, 1959, was followed by anaphylactic shock and death.

Yours, etc.,

RUSSELL ROXBURGH.

"Klewa",  
Abbotsford Road,  
Homebush, N.S.W.  
September 28, 1959.

#### OPENINGS FOR WORKERS IN BLOOD COAGULATION.

SIR: At the recent meeting of the International Committee for the Standardization of the Nomenclature of Blood Clotting Factors at Montreaux, I met Dr. John H. Ferguson, of the Department of Physiology of the University of North Carolina, Chapel Hill, N.C., who informed me that he has a vacancy for a junior associate with two or three years' experience in the field of blood coagulation, and who is interested in laboratory research using clinical or animal material, and who should have an original line of inquiry.

Dr. Ferguson would also like to hear from visiting senior workers who wish to work between six and 12 months in his department.

Interested workers may communicate with the undersigned for further details.

I should like to make known Dr. Ferguson's offer, and would therefore ask you to give it publicity in any form you care to make.

Yours, etc.,

P. FANTL.

The Baker Medical Research Institute  
(Including Alfred Hospital Clinical Research Unit),  
Commercial Road,  
Prahran, S.I., Victoria.  
September 29, 1959.

### Royal Australasian College of Surgeons.

#### RESULTS OF PRIMARY EXAMINATION FOR FELLOWSHIP.

It is announced that the following candidates satisfied the Board of Examiners at the primary examination for fellowship of the Royal Australasian College of Surgeons held in September, 1959, and were approved: Timothy Boyd Cartmill, Leslie James Caust, John Morton Copeland, Thomas Parker Davis, William Napier Etheridge, John Mackenzie Ham, David Frederick Hogg, Thomas Benedict Hugh, Gabriel Andrew Kune, Donald Roger Marshall, Peter John Millroy, Kenneth Arthur Myers, Ian Alexander Penn, Alan William Searle, James McKinnon Watts.

#### Faculty of Anaesthetists.

It is announced that the following candidates satisfied the Board of Examiners at the primary examination for fellowship of the Faculty of Anaesthetists of the Royal Australasian College of Surgeons, held in September, 1959, and were approved: Michael John Bookallil, Harold Wah Kim Chan, Nancy Eunice Edwards, Evan Charles Hallett, Robert Mercer Hart, James Loughman, Donald Charles Maxwell, Newton Potter, Bryan Edmund Sharkey.

### Naval, Military and Air Force.

#### APPOINTMENTS.

The following appointments, changes etc. are published in the *Commonwealth of Australia Gazette*, No. 50, of August 13, 1959.

#### AUSTRALIAN MILITARY FORCES.

##### Australian Regular Army.

##### Royal Australian Army Medical Corps (Medical).

1/8077 Captain C. R. Wilson is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Northern Command), 1st June, 1959.

##### Regular Army Special Reserve.

##### Royal Australian Army Medical Corps (Medical).

NX 700481 Captain L. A. Duncombe is retired, 29th June, 1959.

##### Citizen Military Forces.

##### Northern Command.

**Royal Australian Army Medical Corps (Medical).**—1/39223 Captain (provisionally) R. E. C. Stringer relinquishes the provisional rank of Captain, 29th June, 1959, and is transferred to the Reserve of Officers (Royal Australian Army Medical Corps (Medical)) (Northern Command) in the honorary rank of Captain, 30th June, 1959. The provisional appointment of 1/61844 Captain A. Davison is terminated, 30th June, 1959. To be Captain (provisionally), 1st July, 1959.—1/61844 Alan Davison.

##### Eastern Command.

**Royal Australian Army Medical Corps (Medical).**—The provisional appointments of the following officers are terminated:—Captains 2/137503 R. T. Finch, 9th July, 1958, 2/147954 H. J. Keogh, 23rd November, 1958, 2/116143 I. R. Vanderfield, 13th April, 1959, and 1/61846 N. P. Cleeve, 13th May, 1959. To be Captains (provisionally)—2/137503 Richard Tennant Finch, 10th July, 1958, 2/147954 Herbert John Keogh, 24th November, 1958, 2/116143 Ian Roger Vanderfield, 14th April, 1959, and 1/61846 Noel Pitt Cleeve, 14th May, 1959.

##### Southern Command.

**Royal Australian Army Medical Corps (Medical).**—To be Captain (Temporary Lieutenant-Colonel), 25th June, 1959—3/50293 Kevin McCaul, M.B.E.

##### Central Command.

**Royal Australian Army Medical Corps (Medical).**—4/32074 Captain (provisionally) A. J. Day is seconded whilst in the United Kingdom, 1st November, 1958. The provisional appointment of 4/32074 Captain A. J. Day is terminated, 31st October, 1958. To be Captain (provisionally), 1st November, 1958.—4/32074 Allan John Day.

##### Reserve Citizen Military Forces.

##### Royal Australian Army Medical Corps (Medical).

**Southern Command.**—To be Honorary Captains—John Gavan Fraser, 20th April, 1959, and Maxwell Liddle Hankin, 4th May, 1959.

**Northern Command.**—The following officers are placed upon the Retired List with permission to retain their rank and wear the prescribed uniform, 31st August, 1959: Major J. A. McGree and Captain (Honorary Major) C. N. Sinnamon.

#### ROYAL AUSTRALIAN AIR FORCE.

##### Permanent Air Force.

##### Medical Branch.

**Flight Lieutenant (Acting Squadron Leader) Lawrence Neville Walsh (039386)** is transferred from the Reserve and appointed to a short-service commission, on probation for a period of twelve months, 1st March, 1959, with the rank of Flight Lieutenant and retaining the acting rank of Squadron Leader.

The following are appointed to a short-service commission on probation for a period of twelve months, with the rank of Flight Lieutenant:—George Henry Wright (0219617), 23rd March, 1959; Kenneth William Pritchard (055804), 1st April, 1959.

The resignation of Flight Lieutenant D. T. Burke (0218197) is accepted, 1st May, 1959.

The resignation of the following officers is accepted:—Squadron Leader R. P. V. Checucci (0311661), 15th May, 1959; Flight Lieutenant S. A. Ward (039983), 27th May, 1959.

Flight Lieutenant H. T. Cutler (0314200) is appointed to a short-service commission on probation for a period of twelve months, 5th February, 1959, with seniority as from 21st December, 1957.

Squadron Leader E. H. Stephenson (0312182) is granted the acting rank of Wing Commander, 1st June, 1959.

Alexander Carle Denholm (0310777) is appointed to a short-service commission on probation for a period of twelve months, 25th May, 1959, with the rank of Flight Lieutenant.

The probationary appointment of Flight Lieutenant R. C. Hicks (0310770) is confirmed.

The resignation of the following Flight Lieutenants is accepted, 29th May, 1959:—J. E. S. Alwyn (04778), H. A. Stoksik (0218929).

#### Active Citizen Air Force.

##### Medical Branch.

No. 25 (*City of Perth*) Squadron.—Flight Lieutenant A. G. Fisher (051393) is transferred to the Reserve, 31st May, 1959.

No. 23 (*City of Brisbane*) Squadron.—Flight Lieutenant L. G. Lukin (015224) is transferred to the Reserve, 1st April, 1959.

*Sydney University Squadron*.—Pilot Officer S. B. Renwick (0212684) is promoted to the rank of Flight Lieutenant, 12th December, 1958.

#### Air Force Reserve.

##### Medical Branch.

The provisional appointment of Pilot Officer D. L. Backstrom (015252) is confirmed, and he is promoted to the rank of Flight Lieutenant, 17th April, 1959.

The following Flight Lieutenants (temporary Squadron Leaders) are promoted to the temporary rank of Wing Commander, 3rd April, 1959:—J. B. Curtis (257233), J. D. Hicks (257943), J. A. Snell (257806).

The following former officer is appointed to a commission, 10th January, 1959, with the rank of Flight Lieutenant:—F. I. Walke (012787).

The following Air Cadets are provisionally appointed to a commission with the rank of Pilot Officer:—Richard Townsend Gun (042463), 13th December, 1958; Brian Robert Bolton (054364), John Quinton Carlin (055144), Lawrence Noel Owens (052886), Peter John Ryan (055177), Thomas Bryan Woods (055185), 25th March, 1959; Leonard Christie (0220137), Raymond Francis O'Brien (0220629), William Frederick Webb (0220065), 27th June, 1959.

Flight Lieutenant R. A. Craven (268106) is promoted to the temporary rank of Squadron Leader, 18th March, 1959.

The following Air Cadets are provisionally appointed to a commission, 1st July, 1959, with the rank of Pilot Officer:—Edward Bonaventure Anthony Heffernan (0314283), Trevor James Sylvester Smith (0313378).

The following Flight Lieutenants (Temporary Wing Commanders) are promoted to the temporary rank of Group Captain, 26th May, 1959:—W. A. Seldon (261220), A. R. Robinson (053070), C. P. Hudson (261240), A. M. Johnson (267741).

The following Flight Lieutenants (Temporary Squadron Leaders) are promoted to the temporary rank of Wing Commander, 26th May, 1959:—M. H. M. Ryan (262894), J. G. Shelton, M.B.E. (039592), M. C. Moore (287472), R. G. Mackay (261769), B. S. Mackie (268006), K. S. Harrison (261888).

## Australian Medical Board Proceedings.

### NEW SOUTH WALES.

The following additions and amendments have been made to the Register of Medical Practitioners for New South Wales, in accordance with the provisions of the *Medical Practitioners Act, 1938-1958*.

Registered medical practitioners who have complied with the requirements of Section 17 (3) and are registered under Section 17 (1) (a) of the Act: Banks, Cecil Douglas, M.B., Ch.B., 1945 (Univ. New Zealand); Crumplin, Peter Jose, M.B., B.S., 1957 (Univ. Melbourne); McCarthy, Geoffrey Francis, M.B., B.S., 1957 (Univ. Melbourne); Mickleson, Kenneth Norman Paul, M.B., Ch.B., 1955 (Univ. New Zealand); Ogg, Gerald Jack, M.B., Ch.B., 1954 (Univ. New Zealand); Webb, Daryl Walter, M.B., B.S., 1956 (Univ. Melbourne).

Registered medical practitioners who have complied with the requirements of Section 17 (3) and are registered under Section 17 (1) (b) of the Act: Austin, Margaret Sylvia, M.B., Ch.B., 1942 (Univ. Birmingham); Fairlie, Alexander Melling,

### DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED SEPTEMBER 12, 1959.<sup>1</sup>

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia*
Acute Rheumatism .. ..	..	7(6)	4(1)	..	..	..	..	..	11
Amoebiasis .. ..	..	..	..	..	..	..	..	..	..
Ancylostomiasis .. ..	..	..	..	..	..	..	10	..	10
Anthrax .. ..	..	..	..	..	..	..	..	..	..
Bilharziasis .. ..	..	..	..	..	..	..	..	..	..
Brucellosis .. ..	..	..	..	..	..	..	..	..	..
Cholera .. ..	..	..	..	..	..	..	..	..	..
Chorea (St. Vitus) .. ..	..	..	..	1	..	..	..	..	1
Dengue .. ..	..	..	..	..	..	..	..	..	..
Diarrhoea (Infantile) .. ..	9(3)	3(3)	1(1)	..	..	..	3	3	19
Diphtheria .. ..	..	2(2)	..	..	..	..	..	..	2
Dysentery (Bacillary) .. ..	..	4	..	..	..	1(1)	3	..	8
Encephalitis .. ..	..	..	..	..	..	..	..	..	..
Filariasis .. ..	..	..	..	..	..	..	..	..	..
Homologous Serum Jaundice .. ..	..	..	..	..	..	..	..	..	..
Hydatid .. ..	..	..	..	..	..	..	..	..	..
Infective Hepatitis .. ..	73(22)	16(11)	22(2)	8(5)	3	..	1	..	123
Lead Poisoning .. ..	..	..	..	..	..	..	..	..	..
Leprosy .. ..	..	..	..	..	..	..	4	..	4
Leptospirosis .. ..	1	..	4	..	..	..	..	..	5
Malaria .. ..	..	..	1(1)	..	..	..	..	..	1
Measles .. ..	..	..	..	..	..	..	..	..	..
Measles-coccal Infection .. ..	1	3(3)	3(2)	..	..	..	..	1	8
Ophthalmia .. ..	..	..	..	..	..	..	..	..	..
Ornithosis .. ..	..	..	..	..	..	..	..	..	..
Paratyphoid .. ..	..	..	..	..	..	..	..	..	..
Plague .. ..	..	..	..	..	..	..	..	..	..
Poliomyelitis .. ..	..	..	1(1)	..	..	..	..	..	1
Puerperal Fever .. ..	..	..	..	..	..	..	..	..	..
Rubella .. ..	..	21(9)	..	2	2(1)	..	4	..	29
Salmonella Infection .. ..	..	..	..	..	..	..	..	..	..
Scarlet Fever .. ..	6(4)	16(12)	5(3)	2(2)	3(1)	..	..	..	32
Smallpox .. ..	..	..	..	..	..	..	..	..	..
Tetanus .. ..	..	1(1)	..	1	..	..	..	..	2
Trachoma .. ..	..	..	..	..	4(2)	..	2	..	6
Trichinosis .. ..	..	..	..	..	..	..	..	..	..
Tuberculosis .. ..	16(10)	14(10)	10(4)	10(6)	8(3)	1(1)	2	..	61
Typhoid Fever .. ..	..	..	..	..	..	..	..	..	..
Typhus (Flea-, Mite- and Tick-borne) .. ..	..	..	2	..	..	..	..	..	2
Typhus (Louse-borne) .. ..	..	..	..	..	..	..	..	..	..
Yellow Fever .. ..	..	..	..	..	..	..	..	..	..

\* Figures in parentheses are those for the metropolitan area.

M.B., Ch.B., 1943 (Univ. Glasgow); Jones, Anne Francis, M.B., B.S., 1953 (Univ. London), D.A., London, 1959; Logan, Victor St. Clair Dudgeon, M.B., Ch.B., 1956 (Univ. Liverpool); Sims, Robin Owen Stroud, M.B., B.Chir., 1957 (Univ. Cambridge); Sniegocka, Wanda Lofa, L., L.M., R.C.P. & S., Ireland, 1957.

Registered medical practitioner who has complied with the requirements of Section 17 (3) and is registered under Section 17 (2) of the Act: Herbststein, Amos, M.D., 1946 (Univ. Bucharest).

Registered medical practitioner who has complied with the requirements of Section 17 (3) and is registered under Section 17 (2A) of the Act: Rozycki, Lazar Stefan, M.D., 1934 (Univ. Wilno).

The following have been issued with licences in accordance with the provisions of Section 21C (3) of the Act: Banathy, Laszlo Julius Joseph, Wallsend District Hospital, issued August 26, 1959; Majewski, Stanislaus, Cessnock District Hospital, issued July 22, 1959, Miller, Halina, Ryde District Soldiers Memorial Hospital, issued August 26, 1959.

#### QUEENSLAND.

The following has been registered, pursuant to the provisions of Section 19 (1) (a) and (c) of *The Medical Acts*, 1939 to 1955, of Queensland: Waugh, Shirley Lillian, M.B., B.S., 1956 (Univ. Queensland).

The following have been registered, pursuant to the provisions of Section 19 (1) (a) and (d) of *The Medical Acts*, 1939 to 1955, of Queensland: Sale, Thomas Arthur, M.B., Ch.B., 1940 (Univ. Liverpool), F.R.C.S., Edinburgh, 1949; Greer, Bernard Louis, M.B., B.S., 1952 (Univ. Sydney), M.C.R.A., 1957; de Zwart, Frans Hendricus Wilhelmus, M.B., B.S., 1958 (Univ. Sydney); Tinniswood, Henry Snow, M.B., Ch.B., 1955 (Univ. Edinburgh); Breen, John Thomas, M.B., B.S., 1953 (Univ. Melbourne); Deane, Susan Charman, M.B., B.S., 1955 (Univ. Melbourne).

The following additional qualifications have been registered: Vandeleur, Kevin Walter, M.S., 1959 (Univ. Queensland); Bourne, Robert George, D.C.R.A., 1959; Adair, Cecil James, D.C.R.A., 1959; Lee, John Francis, F.R.A.C.S., 1959.

### Nominations and Elections.

The following has applied for election as a member of the New South Wales Branch of the British Medical Association:

Lennox, Arthur Allan, M.B., B.S., 1953 (Univ. Sydney), 132 Kiora Road, Miranda.

The undermentioned have been elected as members of the New South Wales Branch of the British Medical Association: Dalyell, Lindsay Elizabeth, M.B., B.S., 1956 (Univ. Sydney); White, Peter Wilton, M.B., B.S., 1958 (Univ. Sydney); Becker, Andreas Aloysius, M.D., 1940 (Univ. Szeged) (registered in accordance with the provisions of Section 17 (2B) of the *Medical Practitioners Act*, 1938-1958); Mandula, Esther, M.D., 1925 (Univ. Berlin), M.D., 1927 (Univ. Pecs), (registered in accordance with the provisions of Section 17 (2A) of the *Medical Practitioners Act*, 1938-1958); Sletsma, Anton Samuel Jacobus, M.B., B.S., 1957 (Univ. Sydney); Miller, Douglas Alfred Frank, M.B., B.S., 1958 (Univ. Sydney); Bosch, Edward Graham, M.B., B.S., 1958 (Univ. Sydney); Mead, Phillip Aldworth, M.R.C.S., England, 1957, L.R.C.P., London, 1957, M.B., B.S., 1957 (Univ. London); Gillespie, Ailsa Margaret, M.B., B.S., 1958 (Univ. Sydney).

The undermentioned have been elected as members of the South Australian Branch of the British Medical Association: Gillis, Samuel, M.B., Ch.B., 1944; Valente, Leonard Joseph, qualified M.B., B.S., 1957 (Univ. Adelaide); Thompson, Bryan William, qualified M.B., B.S., 1957 (Univ. Adelaide).

### Medical Appointments.

Dr. G. W. E. Aitken has been appointed Honorary Obstetrician at the Queen Elizabeth Hospital, Adelaide.

Dr. H. J. S. Ross has been appointed Honorary Assistant Obstetrician at the Queen Elizabeth Hospital, Adelaide.

### Deaths.

The following death has been announced.

MORTON.—David Murray Morton, on September 30, 1959, at Toorak, Victoria.

### Diary for the Month.

- OCTOBER 19.—Victorian Branch, B.M.A.: Finance Subcommittee.
- OCTOBER 20.—New South Wales Branch, B.M.A.: Medical Politics Committee.
- OCTOBER 21.—Western Australian Branch, B.M.A.: General Meeting.
- OCTOBER 21.—Victorian Branch, B.M.A.: Clinical Meeting at Royal Women's Hospital.
- OCTOBER 22.—Victorian Branch, B.M.A.: Executive of Branch Council.
- OCTOBER 22.—New South Wales Branch, B.M.A.: Clinical Meeting.
- OCTOBER 23.—Queensland Branch, B.M.A.: Council Meeting.
- OCTOBER 27.—New South Wales Branch, B.M.A.: Hospitals Committee.

### Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

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ALL articles submitted for publication in this Journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations, other than those normally used by the Journal, and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference to an article in a journal the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of article. In a reference to a book the following information should be given: surname of author, initials of author, year of publication, full title of book, publisher, place of publication, page number (where relevant). The abbreviations used for the titles of journals are those of the list known as "World Medical Periodicals" (published by the World Medical Association). If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors submitting illustrations are asked, if possible, to provide the originals (not photographic copies) of line drawings, graphs and diagrams, and prints from the original negatives of photomicrographs. Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

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